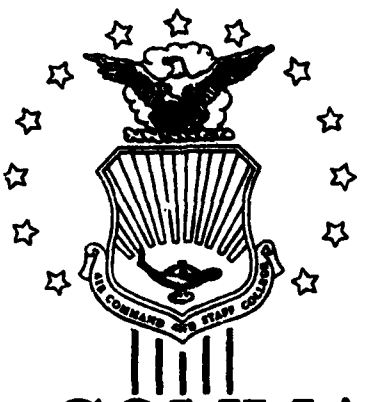


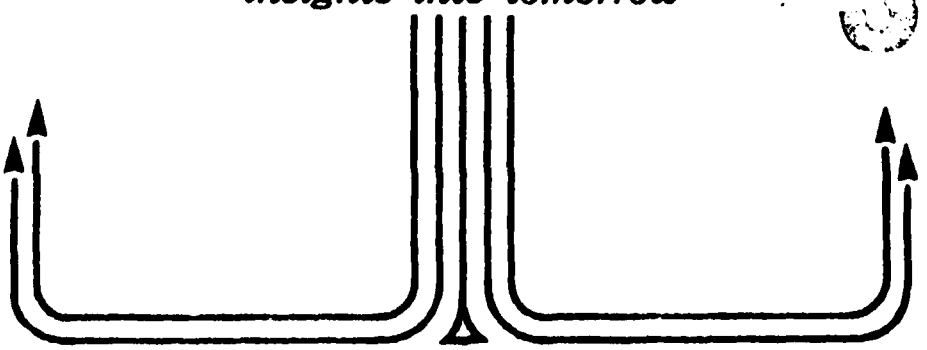
AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

ESTABLISHING MANDATORY ACADEMIC DEGREE GUIDANCE FOR AFROTC RATED OFFICER ACCESSIONS

Major Stephen R. Popelka, USAF 84-2040

"insights into tomorrow"



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TITLE ESTABLISHING MANDATORY ACADEMIC DEGREE GUIDANCE FOR AFROTC RATED OFFICER ACCESSIONS

AUTHOR(S) MAJOR STEPHEN R. POPELKA, USAF

FACULTY ADVISOR MAJOR MICHAEL MICHAUD, USAF

SPONSOR COLONEL ROBERT G. HAINES, JR.
DIRECTOR OF PERSONNEL PROCUREMENT
AIR FORCE MANPOWER AND PERSONNEL CENTER
HQ AFMPC/MPCM

Submitted to the faculty in partial fulfillment of requirements for graduation.

AIR COMMAND AND STAFF COLLEGE
AIR UNIVERSITY
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Investigates a potential dilemma between the need for technical rated accessions and the quality of pilot candidate selections. Addresses the issue through a more analytical determination of technical accession requirements, a review of recent UPT attrition trends, a composite look at current studies isolating attributes indicative of UPT success, and the formulation of attribute profiles for each commissioning source. The project establishes minimum technical accession levels which maintain efficient academic degree guidance while advocating a stance which allows effective freeflow of quality pilot selections.

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PREFACE

As Undergraduate Pilot Training (UPT) attrition rose rapidly since 1979, the Air Force naturally looked to the personnel procurement system to upgrade the quality of pilot accessions. The question of what went wrong or right in past accession programs raised the spectre of regressive, mandatory academic degree guidance constraining quality pilot candidate selections. This project strives to bring together the major personnel procurement issues: requirements, attrition and retention. The project then assesses the impact of recent UPT success studies on the major issues. The analysis is a benchmark effort. It provides a starting point to increase both the efficiency and effectiveness of future personnel procurement strategies.

Special appreciation goes to the men and women of the Officer Accessions Branch of the Air Force Manpower and Personnel Center and the Registrar Offices of the Air Force Reserve Officer Training Corps. Without their help and guidance, this project would still be a vague collection of staff papers.

ABOUT THE AUTHOR

Major Stephen R. Popelka, [redacted], graduated with a Bachelor of Science degree in Forestry from Iowa State University in 1970. He received an Air Force commission through the Reserve Officer Training Corps and reported in August, 1970, to Mather Air Force Base, California, for Undergraduate Navigator Training. Upon graduation from flying training in May, 1971, he was assigned to Loring Air Force Base, Maine, where he served as a KC-135 instructor navigator and flight examiner. In 1975 he was awarded a Master of Science degree in Systems Management from the University of Southern California. In January, 1976, Major Popelka attended Squadron Officers' School enroute to a new assignment at Offutt Air Force Base, Nebraska. He served in the 343rd and 38th Strategic Reconnaissance Squadrons as senior standardization-evaluation navigator till reassignment in 1980 to the Air Force Manpower and Personnel Center at Randolph Air Force Base, Texas. Major Popelka served as a Resource Manager, Tanker Career Management Team and as Chief, Officer Accessions and Technical Training Branch prior to being selected to attend the Air Command and Staff College.

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Part of our College mission is distribution of the students' problem solving products to DoD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

"insights into tomorrow"

REPORT NUMBER 84-2040

AUTHOR(S) MAJOR STEPHEN R. POPELKA, USAF

TITLE ESTABLISHING MANDATORY ACADEMIC DEGREE GUIDANCE FOR AFROTC RATED OFFICER ACCESSIONS

I. Purpose: To establish the validity of the current rated academic degree guidance, document Undergraduate Pilot Training (UPT) attrition in light of recent UPT performance prediction studies, and assess the impact of academic degree guidance on UPT success.

II. Problem: Air Force pilot procurement programs are challenged to meet the personnel demands of a technical Air Force and select the highest quality UPT candidate. As UPT attrition soared, the search for solutions began by addressing the quality of pilot candidate accessions. A technical requirement versus quality dilemma exists if mandatory academic degree guidance constrains selections and bypasses higher quality nontechnical candidates.

III. Data: Tailoring a pilot procurement system to meet the technical needs of the future rated Air Force addresses several issues at once. The procurement strategy is at the same time a requirements issue, a retention issue, and an attrition issue. The requirements issue focuses on technical pilot needs out into the future. The last extensive requirement review for rated officers occurred in 1979 and only analyzed the rated supplement. A detailed technical requirement scrub of the rated force is overdue. The current force structure also impacts the future. Eight percent of all technically qualified pilots are available to meet technical needs in a perfect system. However, personnel and

operational constraints severely reduce the number of officers actually available out of the pool. As a minimum, force replacement numbers plus future requirement growth form the requirements leg of the procurement strategy. The second leg, the retention issue, is very volatile. The last five years clearly demonstrate the wide swings of personnel retention. The issue is well documented and a variety of retention rates are available for comparison. This analysis stresses use of a five year rate for long term planning. The five year rate includes some very good and very bad retention periods. Due to long procurement lead times, a realistic, but conservative rate appears appropriate. The final issue revolves around UPT attrition. Several studies attempted to isolate a wide range of attributes indicative of UPT success. The studies narrowed in on four variables or individual attributes. The ideal pilot candidate was young, possessed a technical degree, held a private pilot's license, and scored 75 or more on the pilot composite of the Air Force Officer Qualification Test (AFOQT). The studies determined the AFOQT pilot composite to be the most powerful indicator of UPT success. The studies also bore out that the quality of the input as measured by the individual attributes plays a small, but important, part in overall UPT attrition. New predictors are required to more accurately forecast UPT success. Additionally, the individual attributes do not address the qualitative factors in selection. Recognizing the limits of the predictive art, each commissioning source was profiled by attribute, and the profiles were compared to attrition trends. Not surprisingly, the commissioning sources with declining or turbulent profiles exhibited the highest and/or the largest increases in attrition. With the issues addressed, a pipeline flow model can be refined which targets the accession need by broad degree area. This analysis calculated but was unable to accurately refine accession targets due to the requirement and individual attribute exigencies. Overall, past academic guidance goals were met easily, but a substantial number of cadets in AFROTC with calculus only were counted as technical accessions. The optimum academic guidance sets an accession floor as low as possible to remain efficient and maintains enough maneuver room above the floor to allow effective freeflow of quality pilot selections.

IV. Conclusions: The conclusions flow directly from the findings. The final conclusion addresses the research hypothesis.

1. A key leg of the requirement strategy, requirements definition, draws on many sources and can be error prone.

2. Pipeline flow model analysis shows the technical accession need was overstated in the past and current strategies continue to do so.

3. Technical needs are extensively programmed to AFROTC and do not take advantage of OTS production potential.

CONTINUED

4. Current individual predictors of UPT success are not consistently accurate; new measurement devices are needed to increase accuracy.

5. None of the cited studies addresses motivation or the whole person concept. All avoid the warrior versus technologist debate.

6. Predictor profiles point to a small, though important, cause of UPT attrition; however, efforts to reduce attrition cannot focus on quality of inputs and exclude resource and training considerations.

7. The current academic degree guidance oversatisfies rated technical requirements and by constraining selections contributed to a decline in AFROTC pilot accession quality.

V. Recommendations: The following recommendations draw from the conclusions and strive to maintain an efficient and effective academic degree guidance strategy.

1. Reduce the pilot academic degree guidance mix in AFROTC to 35-40 percent, split one-third engineers and two-thirds true scientific degrees. The recommendation provides a 88 to 136 officer hedge over the likely case requirement to compensate for availability problems and unforseen future requirement builds. The mix percentages are floor figures; freeflow above the floor for quality may or may not increase technical accessions, but maintains mix efficiency and provides room for the effective freeflow of quality pilot selections.

2. Investigate providing academic degree guidance to OTS. An increase to a 16 percent technical mix in OTS would allow a 5 percent floor cutback in AFROTC. Action should consider the non-rated engineer and technical levies on each source to avoid recruiting problems. Task OTS to recruit by degree (minimum technical percentage) to cover short notice requirement changes which cannot be met by the baseline commissioning sources during accession surges.

3. Institute an annual requirement forecast. Levy pilot technical production goals based on comprehensive annual forecasts in concert with the ATC Officer Procurement Conference. Forecast must cover 3-5 years into the future to properly program the baseline commissioning sources.

4. Incorporate the Air Force Management and Engineering Agency technical requirement study into the next forecast cycle. The study should provide a better look at the "real" total Air Force technical requirement and strengthen the confidence of the rated forecast.

CONTINUED

5. Broaden the AFMEA study to evaluate rated technical requirements.

6. Incorporate the AFHRL UPT predictor study when available. If the AFHRL study improves the prediction art, the results will likely impact technical accessions.

7. Construct a data base large enough to assess technical pilot candidate persistence at UPT. In concert with more definitive requirements, the data would refine pipeline flow variables and produce a more reliable technical accession forecast.

Chapter One

INTRODUCTION

The world is becoming more technologically complex with each passing year. Technology touches every phase of our existence--communications, transportation, medicine, industry. Within the Air Force of today, the importance of the technical revolution is manifested from desk-top computers to the advanced avionics of the B-1 bomber. The Air Force of the future must prepare now to meet the challenge; new officers must meet the demands of new technology (6:2).

Tailoring a personnel procurement program to meet the demands of new technology is nowhere more difficult and important than in the selection of the Air Force pilot. Rated procurement plans to meet technological growth only recently emerged. Pilot training consumes a significant amount of time, money, and resources. In FY 1979 the average cost per Undergraduate Pilot Training (UPT) graduate was over $187,000 (17:1). The FY 1982 cost per graduate had risen to nearly $322,000 (18:1). The magnitude of the investment demands that only the highest quality candidates be allowed to enter training.

The current Air Force personnel programs are challenged to meet the demands of new technology and select the highest quality UPT candidate; however, meeting the challenge may be a dilemma. The dilemma may exist when the Air Force programs UPT accessions to meet technical rated needs, but in doing so force commissioning sources to select candidates with a lower probability of success at UPT. In other words, does the technical push drive the Air Force to pass over better UPT candidates with non-technical backgrounds? In the worst case, a hard decision must be made between the benefit of a technical UPT graduate and the cost of potential UPT attrition and graduate quality. The dilemma is a dual issue: requirements and attrition. This study attempts to put requirements needs in focus with current UPT success indicators and provides a framework for an annual pilot procurement review.

STATEMENT OF THE PROBLEM

The analysis employs a nondirectional hypothesis. The present academic degree guidance for rated officer accessions does not adversely impact UPT accession quality and satisfies rated requirements demanding specific technical degrees.

RESEARCH APPROACH

This research includes a literature search, development of a logical requirements model, and analysis of recent studies and policy decisions relating to UPT training success. Chapter Two provides background on pilot procurement, describes the interactive nature of USAF commissioning sources, reviews the pilot academic degree guidance which answers the perceived need for technical expertise, and sets up a requirements versus quality dilemma. Chapter Three focuses on requirements by detailing the current academic degree guidance, outlining rated force structure, developing a requirements model, and generating several technical accession mixes based on the requirement model variables. Following the requirement review, Chapters Four and Five address the quality side of the dilemma. Chapter Four presents a composite review of a series of studies aimed at isolating UPT predictors of success. The composite review is then used in Chapter Five to assess UPT attrition trends relative to identified predictors of success. Finally, Chapter Six presents the conclusions of the study and recommended courses of action.

RESEARCH LIMITATIONS

This study does not include a treatment of the second highest investment resource, the Air Force navigator; however, the same research models and logic can be used to review navigator procurement. The study is further limited by not considering professional attributes such as officership. Such critical attributes are assumed constant. The analysis infers officer quality will be weighed in a whole person selection and developed in the commissioning program. Further, the Air Training Command training programs were not reviewed in detail as a possible contributing cause of UPT attrition. Lastly, the research and analysis pertains only to the active Air Force, since the National Guard and Air Force Reserves operate under a different selection system and comprise a small portion of total UPT accessions.

Chapter Two

PROCUREMENT PROGRAM BACKGROUND

The current pilot procurement program is based on planning future needs and programming to meet the needs. The planning and programming function considers three major factors: the character of the commissioning sources, requirements, and training. This chapter explores the character and historical trends of these factors to fashion a foundation for later development.

AIR FORCE COMMISSIONING SOURCES

Any organization must accomplish four basic tasks to ensure a sustained, viable force. It must identify personnel requirements, attract and train the right people; place the most suited people in each job, and maintain the resulting force structure (12:1). The task of attracting and training officers falls on three Air Force commissioning sources: the Air Force Academy (AFA), Air Force Reserve Officer Training Corps (AFROTC), and Officer Training School (OTS).

The AFA and AFROTC form the baseline of future Air Force officer accessions. The baseline identifies the stable, core accession sources programmed to mirror the future Air Force. Characterized by lead times of four or more years, the AFA and AFROTC must be carefully planned to meet long term Air Force needs, in many cases growing technological needs. To attract the right people, the Air Force has packed the AFA and AFROTC arsenals with education and pay incentives. AFROTC alone uses over 8000 scholarships to recruit to critical requirements (21:4). The four year scholarship program attracts about 15,000 applicants each year, with about twenty percent being awarded a scholarship (11:71). Therefore, the bulk of the hard to get, critical Air Force personnel needs fall on the baseline commissioning sources.

In contrast to the long range nature of AFA and AFROTC, OTS functions as the shock absorber in the procurement equation. Its short six to nine month lead time provides the upward and downward flexibility needed to meet unprogrammed requirement changes. The annual budget battle and resultant accession level of uncertainty places even greater significance on the flexibility of OTS. OTS flexibility provides the capability to maintain the long term baseline programming of AFA and AFROTC. However, in order to capitalize on that capability, the Air Force must recognize the strong need to accurately program the baseline sources. Academic degree guidance has been the heart of the recent programming process.

REQUIREMENTS AND ACADEMIC GUIDANCE

The task of meeting accession requirements is characterized over the last two decades by the development of academic degree guidance. The history of rated academic degree guidance goes back to the 1950s when the technical revolution was still in its infancy. In the 1950s, specific AFSCs called for certain educational backgrounds and in 1962, a forward looking Air Force led the services with the mandatory college degree (13:14). The decision withstood several years of scrutiny, especially regarding pilot accessions. By the 1970s, non-rated accession goals by broad degree category reflected the march of technology and requirement changes. In the late 1970s, a formal rated accession strategy emerged outlining broad degree needs. The rated approach, from its infancy, has changed little and remains based on weak analytical capability. The lack of sophistication prompted an unfinished review of the effect of rated degree guidance on UPT attrition. The prevailing policy emphasizes projected requirements, not UPT potential, as the primary justification for a technical mix policy executed through academic degree guidance.

UPT ATTRITION

The task of selecting pilot candidates rests with each commissioning source. Historically, the quality of pilot selectees has been measured by UPT attrition. More recently, the academic degree guidance constrained pilot selections.

Concurrently with the first attempts to procure specific degreed pilot candidates, UPT attrition soared to historically high levels. The graph at Figure One dramatically shows the increase since FY79. Congressional budget pressure and the high cost of attrition (over $24 million) drove a major procurement review clearly expressed in the opening remarks of the 1982 Pilot Selection and Screening Conference:

> Due to escalating costs of training and increased complexity of our weapon systems it is increasingly imperative that we pick the best qualified candidate to enter UPT...many indicators point to the need to improve our ability to select successful pilot candidates. Some examples given were rising attrition rates, demanding mission requirements and increased training costs. (15:1)

The cost and attrition impact drove the startup of several technically literate studies on UPT predictors of success which are reviewed in Chapter Four.

SUMMARY

The planning and programming efforts of the personnel procurement program have evolved slowly. The program must recognize the strengths and constraints imposed by each commissioning source. Over time, the

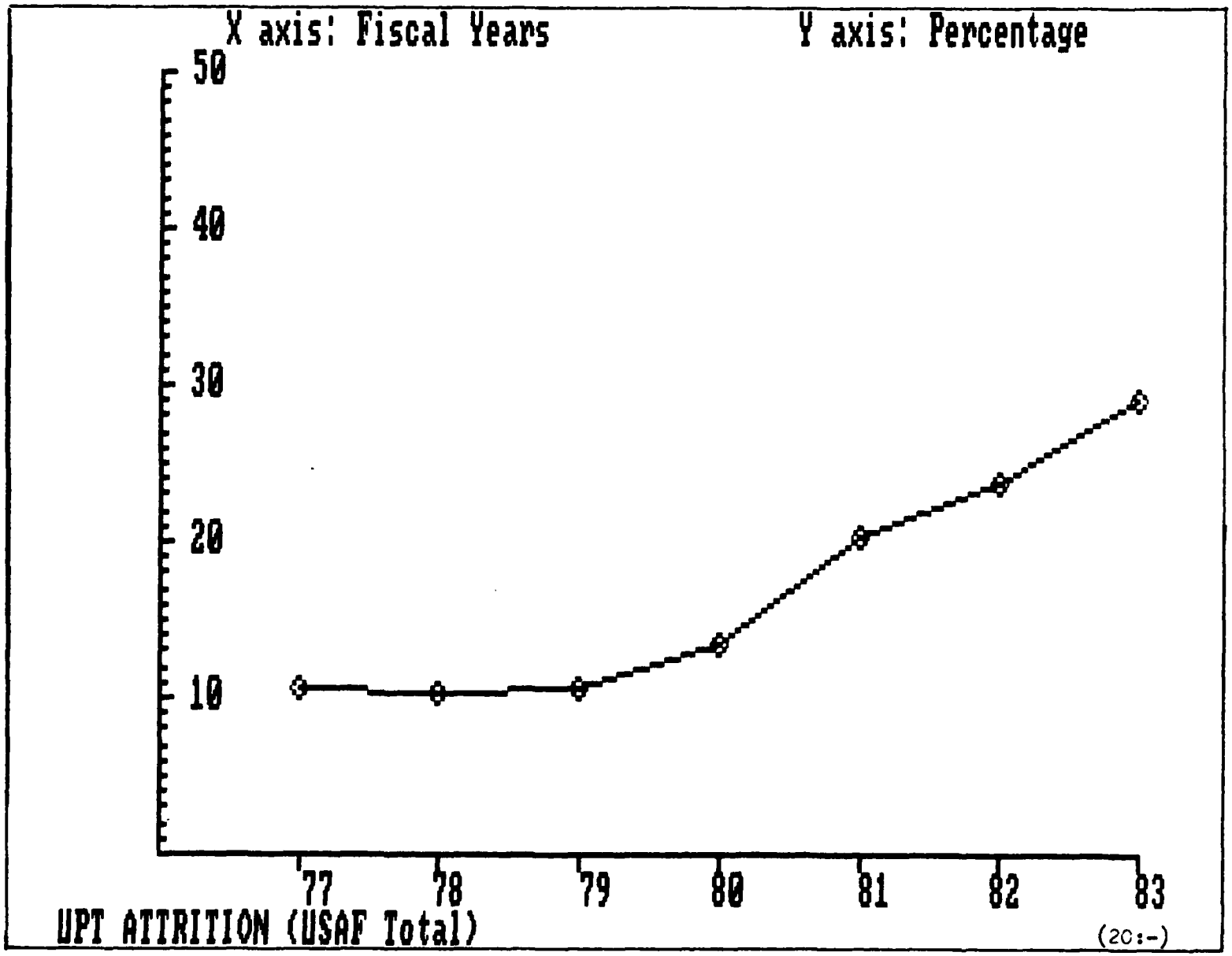
X axis: Fiscal Years
Y axis: Percentage
50
40
30
20
10
77
78
79
80
81
82
83
UPT ATTRITION (USAF Total)
(20:-)

FIGURE ONE

program has met AF pilot requirements by promulgating academic degree guidance to the baseline sources and flexing OTS as required. However, the benchmark of success, UPT attrition, has called for a serious review of the program. The challenge today remains to meet the demands of technology and reconcile specific rated degree requirements with the most recent analysis of UPT predictors of success. The potential dilemma of satisfying both requirements and quality is the focus of the next three chapters.

Chapter Three

REQUIREMENTS DETERMINATION

Determining pilot requirements is the first step in resolving the dilemma of requirements and attrition. This chapter outlines the present academic degree guidance, reviews current rated force structure, develops a pipeline flow model, and provides a past and future accession comparison.

CURRENT ACADEMIC DEGREE GUIDANCE

Since its formal introduction in 1979, academic degree guidance has been formulated through strategy conferences hosted by HQ ATC. The cross agency forum searches for strategy concensus while optimizing the strengths of AFROTC and OTS. The AFA production is a given entry into the procurement strategy. The strategy for all categories, excluding nonrated nontechnical accessions, centers on technical versus nontechnical production objectives and degree guidance within each objective. Nontechnical selections have freeflowed based on potential officer quality alone. At this point confusion may enter; what is a technical accession? Technical degree needs are rooted in functional requirements and technical accessions are defined by six degree areas:

1. All engineers (excludes engineering technologists)
2. Math
3. Physics
4. Computer Science
5. Meteorology
6. Architect

With functional needs in hand, the strategy conference sets the commissioning baseline for four plus years. Due to the extensive AFROTC programming efforts and the long lead time, the conference decisions are characterized by virtually no upward flex and little downward flex in the short term. The imperative of long term programming demands an indepth review of academic guidance.

An informed personnel analyst described the present academic degree guidance as the product of current conventional wisdom (22:1). While the analyst's comment asserts the guidance is not grounded in detailed analysis, it does provide a benchmark of functional, staff, and resource manager collective wisdom and expert intuition. The resulting FY85 and beyond program objectives and pilot academic degree guidance are outlined in Table One (30:2-4; 21:3-4). The guidance levied by the strategy confer-

AFROTC ACADEMIC DEGREE GUIDANCE

Jan 83 Conference Results

CATEGORIES	FY 85 ACADEMIC MIX	FY 86 and beyond MIX
Pilot and Nav	20% Engr/30%Sci-Tech 1/	20% Engr/30% Sci-Tech
Missile	50% Engr/Sci-Tech 1/	50% Engr/Sci-Tech
Scientific-Technical	Architecture 4%	4%
	Computer Sci 38%	37%
	Math 40%	40%
	Meteorology 6%	6%
	Physics 12%	13%
Nontechnical	Quality Freeflow 2/	Quality Freeflow 2/
Engineer	Work toward FY 86 mix	50% Electrical/9% Civil 25% Aero Group/8% Nuclear 8% Mechanical/3% Industrial 3% Others 3/

Jan 84 Conference Results

CATEGORIES		FY 86 and beyond MIX		
Pilot and Nav		50% Engineer/Sci-Tech/CALO 1/		
Missile		40% Engineer/Sci-Tech/CALO 1/		
		FY 86	FY 87	FY 87
Scientific-Technical	Architecture	4%	4%	4%
	Computer Sci	48	43	40
	Math	30	35	38
	Meteorology	6	6	6
	Physics	12	12	12
Engineer	Electrical	40%	50%	50%
	Aero Group	25	25	30
	Other 3/	35	25	20
Nontechnical		Quality Freeflow 2/		

1/ Includes cadets with a minimum of 6 hours of integral and differential calculus with 'C' or better grades (CALO)

2/ Includes 100 CALO cadets

3/ Excludes several low volume degrees and all technologists

TABLE ONE

ences is heavily weighted towards technical areas and resorts to extensive programming of AFROTC. The charted figures reflect the belief that technical requirements are pervasive and will continue to remain high.

Despite the belief technical requirements will remain high, the strategy conference position softened across several AFROTC accession categories in the last year. The January 1983 conference eliminated calculus only cadets (CALO) in the outyear pilot/navigator and missile categories. A CALO holds a non-technical degree with six hours of calculus and qualifies for some low tech active duty requirements. The major outyear thrust centered on gradual movement toward matching technical degree holders with projected technical requirements. Additionally, the degree guidance was presented as an objective to be met. Conversely, the January 1984 conference returned to CALO accessions, removed the outyear rated engineer accession objective, and stressed the academic mix criteria as guidance only--not as an objective (21:3). The author did not find the changes based on any rigorous analysis, but rather the changes appear to reflect current enrollment and perceived recruiting environment. A move away from a conventional wisdom approach is required to meet the future technical challenge.

General J. P. Mullins stressed the need to meet the future challenge based on the current situation.

> We have gotten ourselves into a manpower squeeze in which engineers, computer experts, and trained blue collar workers are in very short supply....we now look at potential shortfalls of 33% for engineers, 49% for computer specialists, and 84% for statisticians (7:5-6).

The pilot force helps meet the manpower challenge through career broadening in the rated supplement and technical staff positions. Also, the future Air Force leader needs a broadened view to plan, develop, and implement technical weapons in a technical service (4:27). All these factors have resulted in a consensus of conventional wisdom which drives academic degree guidance to focus on technical areas and solve manpower problems resulting from current and projected force structure.

CURRENT FORCE STRUCTURE

The current rated force structure is the starting point to build the future. Describing the current pilot demographics by gate position, major weapon system, and assignment category is an important first step. The complexity of the pilot population must be addressed to evaluate the results of later modeling.

Of the total pilot population LTC and below, over 6700 possess technical degrees and could fill technical manpower requirements and career broaden to meet the future leadership demands of technology. However, a variety of factors limit the availability of pilots for technical duty. Many are young, inexperienced, or are needed as front line combatants.

Additionally, 38% have less than six years cockpit experience, 37% are assigned to critically manned fighter cockpits, some possess dated academic credentials, and a substantial portion are already serving in technical areas. Figures 2, 3, and 4 show the complex nature of the pilot force just described and indicate that only eight percent of all technically qualified pilots are available in a pool to meet future technical growth (25:11-13). Additionally, the pool is actually much smaller due to the impact of assignment policies, desired aircrew experience levels, professional military education opportunities, and poor performers (25:13).

The pilot force today appears ill-prepared to meet future technical needs and the force of current conventional wisdom tasks Air Force commissioning sources to produce large numbers of flying qualified technical officers. To meet the current and future challenge, efforts must be focused on determining optimum technical production levels.

PIPELINE FLOW MODEL

The flow model defines pilot engineer and technical requirements into the future and determines the accession need by incrementally backing through a career pipeline. The two step process offers a detailed scrub down of current requirements tempered with future trends and a simple mathematical model which addresses critical pipeline variables. The first and key step is requirement definition. The Air Force Systems Command Chief of Staff stated an organization must know the requirement before any procurement baseline can be established. MG Chubb was referring to weapon systems, but the analogy is true for officer procurement. The Air Force must know the requirement for technical officers before structuring a procurement baseline within the commissioning sources.

This requirement definition uses the 1979 USAF Rated Supplement Review Board Report (RSRB) as a starting point along with outyear technical and operations funding (26:-). The RSRB defined the rated supplement need for pilots in the 1979 force structure. Future trends are identified by detailing the FY83 rated supplement manning measuring planned growth, and applying expert opinion to determine outyear direction. For the future, The Air Force Management and Engineering Agency in 1984 will undertake a comprehensive review of all officer specialties with an eye towards breaking out technical needs (36:-). In the interim, the consensus position of an early 1983 AFMPC working group and a 5 Jan 84 update provided for this study is presented in Table 2. The requirement projection shows annual input of 457 pilots every year in technical positions. One third of the total are engineers (25:-). Accounting for continuations and return tours indicates an annual requirement of 397 pilots. Armed with the requirement, the accession level can be determined with a pipeline flow model.

The accession need is dependent on several variables: assignment policy, UPT attrition, and retention at the end of initial obligation. HQAFMPC/ROR7 provided long standing assignment policy on tour lengths, rated supplement continuations, and flying gate management (25:8). The AFMPC working group and other action officers believe current constraints

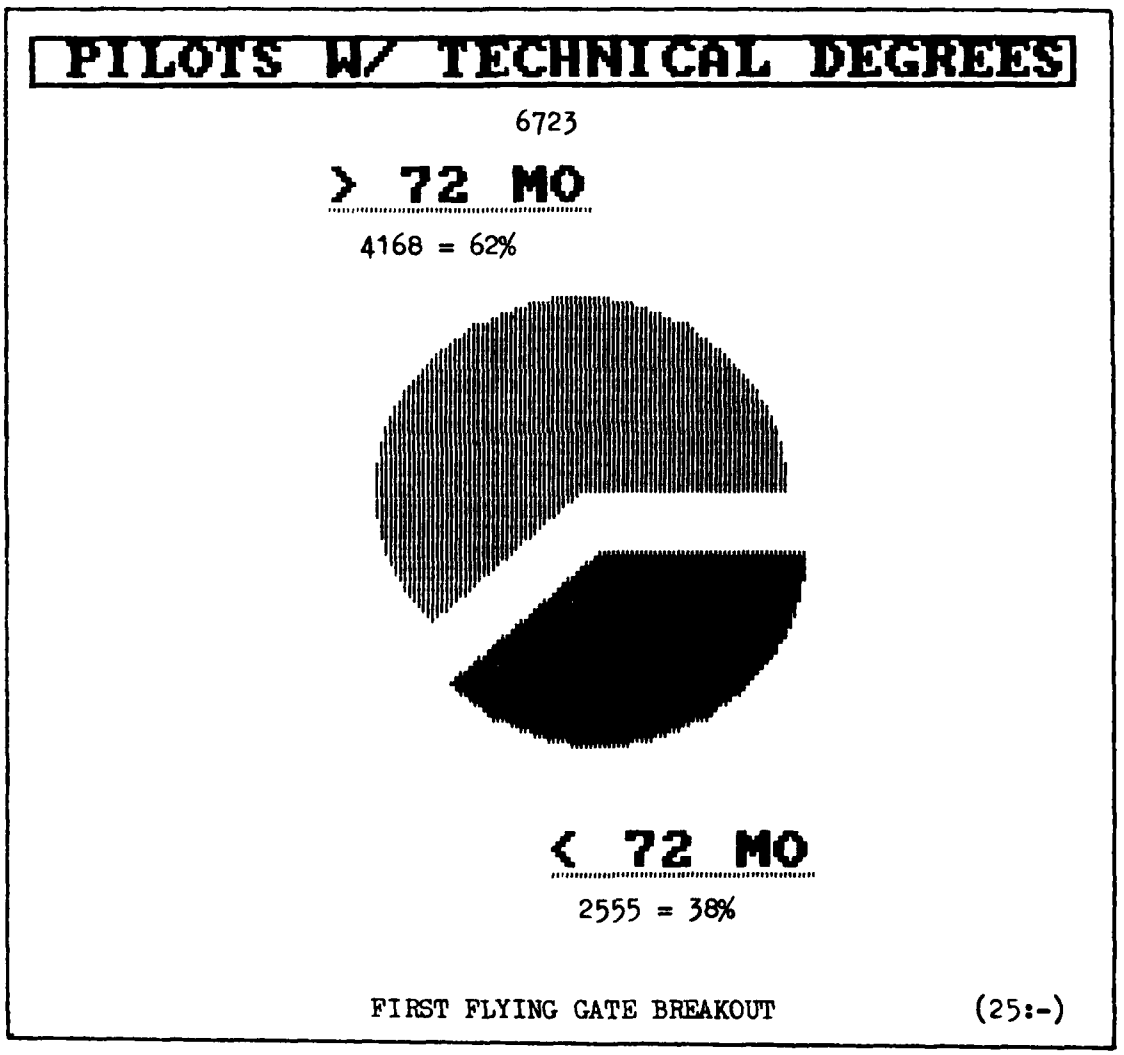
PILOTS W/ TECHNICAL DEGREES
6723
> 72 MO
4168 = 62%
< 72 MO
2555 = 38%
FIRST FLYING GATE BREAKOUT
(25:-)

FIGURE TWO

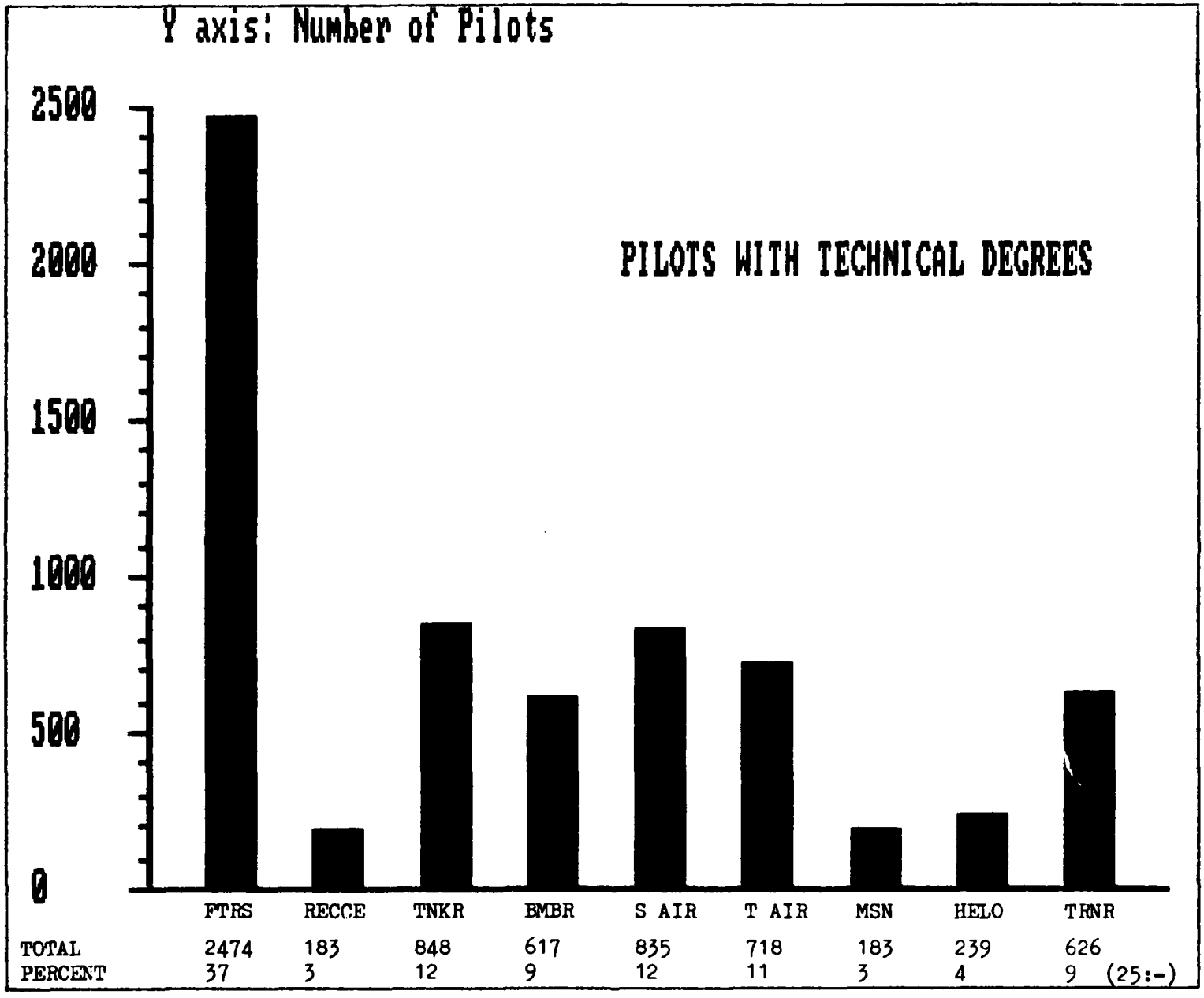

FIGURE THREE

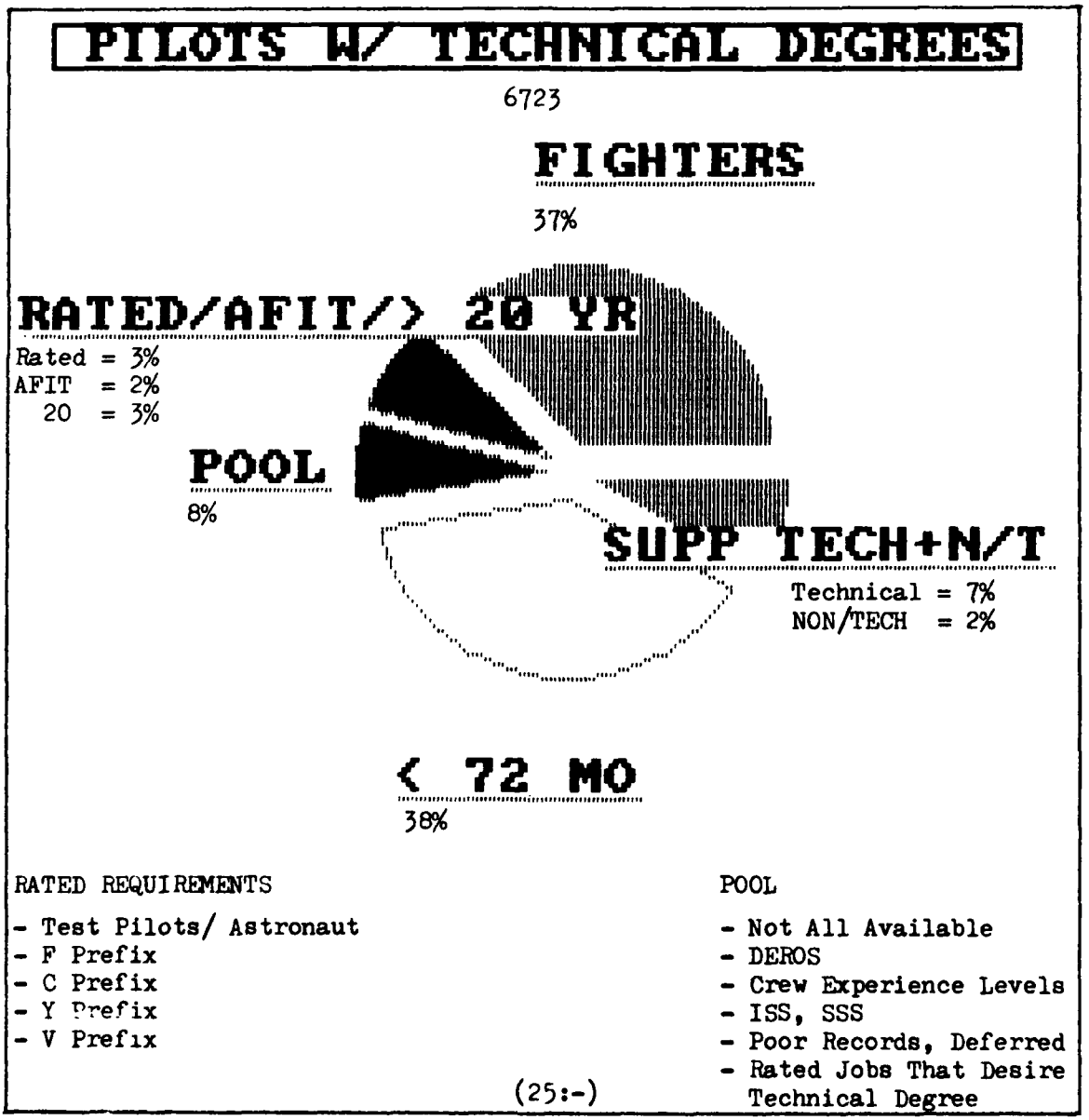
PILOTS W/ TECHNICAL DEGREES
6723
FIGHTERS
37%
RATED/AFIT/> 20 YR
Rated = 3%
AFIT = 2%
20 = 3%
POOL
8%
SUPP TECH+N/T
Technical = 7%
NON/TECH = 2%
< 72 MO
38%
RATED REQUIREMENTS
- Test Pilots/ Astronaut
- F Prefix
- C Prefix
- Y Prefix
- V Prefix
(25:-)
POOL
- Not All Available
- DEROS
- Crew Experience Levels
- ISS, SSS
- Poor Records, Deferred
- Rated Jobs That Desire Technical Degree

FIGURE FOUR

TECHNICAL PILOT REQUIREMENTS

Rated Supplement*	RSRB	FY83 Actual	FY84 Target	AFIT*	
ENGR/SCI/TECH	539	553	600	USAFA	20
COMPUTER SCI	47	21	47	OLMSTEAD SCHOLAR	2
MANPOWER	15	7	15	AFIT FACULTY	2
WEATHER	7		7	CMD SPON ED PROGRAM	10
SPACE OPS	8	15	50**	SCHOLARSHIP/AFIT	90
			719		124

*Utilizes a 2/1 historical ratio pilots to navigators

**With growth in field, 10 per year to AFIT

TEST PILOTS	20 per year	USAFA	
ASTRONAUTS	1 per year	V Prefix	52
	21		
F PREFIX	102	0904	4
C PREFIX	102	75XX	9
Y PREFIX	73**	TEST PILOTS	1
	277		66

***Total fluctuates significantly between pilot and navigator depending on availability of either type of rated officer. The 277 reflects 58% pilots while pilots comprise 70% of rated inventory. To mirror inventory requires 334 pilots.

$$\text{ANNUAL INPUT} = \frac{\text{Requirements (Supplement, F, C, Y, USAFA)}}{\text{Average Tour Length}} + (\text{Test Pilot} + \text{AFIT})$$

$$\text{ANNUAL INPUT} = \frac{1062}{3.4} + (21 + 124) = 457 \text{ Technical Pilots per year}$$

ANNUAL REQUIREMENT = ANNUAL INPUT - (Continuations and second tours)

ANNUAL REQUIREMENT = 457 - 60 = 397

TABLE 2

will continue into the forseeable future (25:8). UPT attrition data was secured from HQATC (20:1) and is a volatile variable, particularly in light of the attrition runup of the last few years. The model uses USAF programmed attrition. The least certain variable is pilot retention. Several retention rates provided by HQAFMPC/POF are used to depict the potential range of pilots available for technical tours at completion of the first flying gate (about seven years). Table 3 presents the tabulated data from several iterations of the model.

PIPELINE FLOW MODEL

Pipeline Flow: $X = \frac{T}{(1-Y)(CCR)}$

When: X = Required Accessions
Y = UPT Attrition
T = Technical Pilot Requirement
CCR = Cumulative Continuation Rate (Retention)

Best Case/Worst Case Analysis:

Accession Need	Programmed % UPT Attrition	Cumulative Continuation Rate	Technical Pilots @ 7 - 10 yr. Requirement
635	19.2 (FY84)	.774 (1 yr. rate)	397
705	19.2 (FY84)	.697 (2 yr. rate)	397
973	23.7 (FY85)	.535 (5 yr. rate)	397

TABLE 3

The cumulative continuation rates depict some of the best and some of the worst retention experienced by the Air Force. The one and two year rates reflect the exceptionally favorable rates of the last three years. The five year rate includes two years of very poor retention in addition to the recent good years. As such, the accession need at the five year rate is not a true worst case. Additionally, the most likely accession need is dependent on an assessment of uncertainty beyond retention and attrition rates.

Two major uncertainties could cause the model to misstate the future. The major uncertainties are unforseen requirement changes and aircrew experience and availability factors. Even sophisticated manpower models used as tools for planning are limited by the major uncertainties of forecasting changes in size and mix of units (9:21). However, despite the limitations of the pipeline flow model, the model serves to place the issue in focus. Using five year continuation rates and FY85 programmed attrition,

requirement changes will alter the accession need by a factor of 2.4. Aircrew constraints are dependent on a multitude of manning, experience constraints. Indeed, the fighter major weapon system is a prime example of constraints in the current force structure. Limited fighter pilot availability simply ties up the technically qualified pilot in a higher combat flying priority. The optimum accession level mix must recognize and deal with this kind of uncertainty.

ACCESSION MIX COMPARISON

The requirements scrub down and the flow model analysis call for a technical accession level between 635 and 973. A look at the recent past to access the difficulty of attaining the future is in order. Technical pilot production by commissioning source is outlined in Table 4. (25:-, 33:-)

TECHNICAL PILOT PRODUCTION
Number/Percent of Production

		FY79	FY80	FY81	FY82	FY83	FY86 Forecast
ROTC	Engr	173/29	213/29	236/27	248/28	248/23	
	Sci/Tech	188/32	146/20	181/21	195/22	163/15	
	CALO	79/13	131/17	103/12	30/ 3	29/ 2	
	Total	440/74	490/66	520/60	473/53	440/40	480/50
OTS	Engr	N/A	27/12	27/7	27/5	59/8	
	Sci/Tech	N/A	8/ 4	17/4	44/8	23/3	
	Total	N/A	35/15	44/11	71/13	82/10.5	86/11.8
AFA	Engr						
	Sci/Tech						
	Total	631/100	597/100	587/100	584/100	574/100	639/100
Grand Total		1071/87	1122/72	1151/62	1128/56	1096/55	1205/52

TOTAL PILOT PRODUCTION BY SOURCE

ROTC	596	744	870	891	1087	960
OTS	N/A	227	404	552	779	728
AFA	631	597	587	584	574	639
Total	1227	1568	1861	2027	2440	2327

TABLE 4

Since 1979, due to the technical orientation of the AFA Curriculum and by extensively programming AFROTC and freeflowing OTS, the Air Force has met and is capable of meeting the present production objectives. In most years, production outstripped the objective significantly. The data implies

a reasonable expectation that the outyear objectives are attainable, although an unknown number would be AFROTC CALO cadets and not true technical accessions.

SUMMARY

The current academic degree guidance for pilots has been met; however, no real consensus exists on just what forecasting vehicle should be used to determine the degree guidance. By performing a detailed scrub of current requirements, analyzing trends, and imputing some conventional wisdom, a requirement definition can be imputed to a simple mathematical model to define the accession need (i.e., production objective). Armed with the knowledge uncertainties exist which cannot be quantified, the decision maker can refine the optimum pilot technical production level. While the Air Force commissioning sources produced pilot candidates to meet the recent fiscal year objectives, those young officers have attrited at UPT at an alarming rate. Has the procurement system caused the selection of candidates with lower probability of success at UPT? The next two chapters shift focus to the second part of the potential accession dilemma: pilot training success.

Chapter 4

UPT PREDICTORS OF SUCCESS

A literature search of pilot attrition studies and papers over the last decade attests the significance of the issue and the high level of interest. Pilot training is expensive, time consuming, and the graduate pilots become the building blocks of front line combat capability. UPT attrition amounts not only to lost training costs, but also the loss of potential combat pilots. The most recent attrition increase built to alarming levels and occurred during a significant pilot inventory shortfall. UPT attrition increased overall from 10.6 percent in FY77 to 29.0 percent in FY83 (20:1). Admittedly, the 26 percent pilot production increase in the same time period (1263 to 1589) could account for some of the increase. However, the attrition trends drove new studies on UPT predictors of success. The recent efforts capitalized new computer capabilities, incorporated uniform data and analytically assessed UPT potential. This chapter reviews the new studies, assesses their limitations, and addresses future possibilities. All supporting figures are located in the Appendix A.

RECENT STUDIES

Since 1981, several major studies isolated UPT predictors of success within the current OTS and ROTC selection and evaluation system. The findings of each study were developed by examining a range of individual attributes which are related to UPT success. The results are summarized in Table 5 (25:2). The first three studies targeted specific UPT populations: OTS graduates, AFROTC graduates, and active duty officer selectees. The fourth study correlated previously identified attributes.

The OTS Age Study, completed in 1981, developed a four variable attribute profile for UPT success: private pilot license (PPL), age, Air Force Officer Qualification Test pilot composite score (AFOQT-P), and a technical degree. The results indicate private pilots perform extremely well at UPT, younger candidates do better, technical degree holders do better, and those with AFOQT-P scores of 75 or more do significantly better (31:1). The study results were provided to field recruiters via a scoring matrix to indicate the type of pilot candidate to recruit and were briefed to OTS selection boards. A 1983 USAF Recruiting Service update study reconfirmed the original findings (31:3).

The AFROTC Age Study concluded in 1982 with similar results. The study sought an AFROTC success matrix and confirmed two factors: techni-

STUDIES ON UPT PREDICTORS OF SUCCESS

STUDY (OPR)	PPL	AGE	AFOQT-P	TECH DEGREE	ACTION
OTS AGE STUDY (ATC/RS)	YES	YES	YES	YES	OTS Selection System Refined
ROTC AGE STUDY (ATC/RS)	N/A	NO	YES	YES	Update AFROTC Selection System (FY 85 and beyond)
ACTIVE DUTY STUDY (MPCYAO)	INCONCLUSIVE	INCONCLUSIVE	YES	INCONCLUSIVE	Brief Selection Boards
UPT PERFORMANCE PREDICTION MODEL (MPCYAO)	YES	YES	YES	YES	Correlate Previously Identified Predictors & Update Database

Source: MPCMOA/MPCYAO (25:15; 23:9)

TABLE 5

nical degree and AFOQT-P scores. Age was not a factor, but the results corroborated the earlier OTS age study. Most AFROTC candidates are young and nearly all are less than 25 years old (31:2). A private pilot's license (PPL) was not included in the matrix because so few PPL holders were in the sample; however, of those sampled almost all succeeded at UPT. The study conclusions drove tougher field selections within AFROTC and turned the ROTC Flight Instruction Program into a screening device as well as emphasizing motivation for flying (31:2-3).

The 1982 Active Duty Study targeted a much different population consisting only of active duty officers selected for UPT. The limited size of the sample resulted in mostly inconclusive findings; but, the study did confirm the AFOQT-P as a success factor. Navigators, unlike non-rated selectees and any other accession group, performed exceptionally well at UPT regardless of attribute profile.

Lastly, AFMPC developed a UPT Performance Prediction Model in 1983 to correlate previously identified predictors and update the database. The driving forces behind the analysis were questions of correlation of attributes. Technically degreed candidates did better at UPT, but also scored higher on the AFOQT-P composite. The analysis strove to identify tradeoffs and assess the significance of each attribute after accounting for the effect of the other attributes. In essence, the study separated the real effect from self fulfilling prophesy. The analysis concluded each attribute was statistically related to UPT performance (23:3). Sample multiple stepwise regression results are included at Figure 5. As depicted in the graph, for any given age and AFOQT-P score those with both a PPL and a technical degree would be most likely to complete UPT while those with neither would be least likely. However, life is not so exact. For example, Figure 6 graphically shows the decile groupings on one regression line are far from a perfect fit.

The tradeoff estimates for each alternative model are depicted in Table 6 (24:1-3). In some instances, groups with lower AFOQT-P scores completed UPT with higher success rates. In light of the variability, four alternative models were developed. Each of the four alternative models used a different adjustment cut by elimination phase and elimination reason. The original model, of course, made no adjustments. The first two alternative models included both the T-37 and T-38 phases of flying instruction. One excluded self induced eliminees (SIEs) and medical eliminations, while the other excluded all forms of elimination except flying training (FTD) and academic deficiencies. The latter two deficiencies reflect the cognitive and psychomotor domains of an individual which are critical to a quantitative pilot selection system (14:11-12). The last two alternative models estimate the probability of completing the T-37 phase by treating T-38 eliminees as graduates and using the same elimination categories as the two earlier alternatives.

TRADEOFF ESTIMATES
IF ALL ELSE IS EQUAL

SUCCESS PROBABILITY

ALTERNATIVE MODEL ADJUSTMENT	AFOQT-P (PER 10 PTS)	PPL	TECH	AGE (PER YEAR)
- None	3.5%	6.6%	4.6%	-2.6%
- SIEs and Med elims excluded	3.3%	4.6%	4.6%	-1.5%
- includes only grads and FTD or academic elims	3.2%	4.7%	4.7%	-1.6%
- SIE and Med elims excluded; T-38 elims treated as grads, (estimate probability of T-37 completion)	2.3%	5.4%	2.3%	-1.4%
- includes only grads and FTD or academic elims; T-38 elims treated as grads	2.2%	5.4%	2.9%	-1.5%

TABLE 6

The results from all the models are quite similar and show AFOQT-P, PPL, a technical degree, and youth are related to UPT success (24:1). The alternative models did not improve predictive ability because all alternatives had lower correlations between estimated success and actual UPT completion than the original model. Since no accuracy improvement was noted, the analysis recommended focus on the original model which paralleled earlier studies (24:3). Additionally, the analysis recognized the need for additional research to improve prediction accuracy.

DRAWBACKS

Although each study pointed out general, positive relationships, the limits of the studies were evident. The last AFMPC study recognized the shortfall and stated the need for additional aptitude measures to improve the accuracy of individual predictions (23:4).

Other aptitudes such as psychomotor skill, ability to think under pressure, etc., are not captured in the models and are required to do well at UPT (23:4). Motivation, a key ingredient for success in any field, cannot be thoroughly evaluated by quantifiable factors. The whole person concept as viewed through a selection folder or selection interview cannot be discounted. Indeed, some determinants of UPT success may have little relation to individual attributes.

Another school of thought relates attrition partially to the UPT environment and resources available to train students. Figure 7 demon-

strates a correlation between attrition and the student-instructor ratio. While the charted relationship does not demonstrate cause and effect, the correlation does bring out questions for analysis. What external events impact attrition? Figure 8 shows over the years another correlation between base loading and attrition (27:16). These two quick looks indicate attrition may be much more complex than individual attributes.

Despite the drawbacks, the series of predictor studies do provide valuable insight into what makes a quality UPT candidate. Pilot candidates must be selected today to meet the Air Force needs of tomorrow. The recent studies can and have been used to help selection boards assess pilot potential until better measures are available. Overall, analysts believe the attribute profile plays a relatively small, although important, part in overall UPT attrition (23:1). Efforts to reduce attrition must start with high quality accession; however, substantial reductions likely hinge on the composite effect of accession, environment and resource changes.

STUDIES FOR THE FUTURE

While the Air Force updates the accuracy of recent studies, the Air Force Human Relations Lab (AFHRL) continues a long term pilot research project. The AFHRL project focuses on identifying new predictors and validating current evaluation tools. The project is needed to improve the accuracy of UPT performance prediction. One focus tests psychomotor ability directly through the use of computerized video devices. However, attacking and evaluating a wide range of variables is time consuming. The project is still in the data gathering stage and results are years away from incorporation with currently validated attributes (35:-).

SUMMARY

Catalyzed by the attrition trends since 1979, the recent UPT predictor studies have developed valuable, but limited, insights into selecting quality pilot candidates. The studies continually indicated the ideal pilot candidate is young, possesses a private pilot's license, technical degree, and AFOQT-P score of 75 or above. AFROTC and Recruiting Service implemented the findings of the studies by tailoring their selection systems. The results are just beginning to show for OTS graduates and AFROTC results (long lead source) will show in FY 85 UPT classes. The limits and drawbacks of the studies indicate the attrition issue is complex and some determinants of UPT success may bear little relationship to individual attributes. The future demands continued analysis, completion and potential incorporation of the AFHRL project, and continued emphasis on the qualitative factors of UPT selection.

Chapter Five

Trends and Profiles

Given the state of the UPT prediction art, procurement agencies must reconcile pilot selections. And just as future pilot requirements drive the selection process, the second major factor, UPT success, must be given an appropriate share of the force driving pilot selections. Clearly, a significant portion of the future USAF officer corps requires good technologists and good pilots. Selection methodologies face the dilemma of meeting future requirements while ensuring a quality pilot force. This chapter focuses on the past. The review will track recent UPT attrition and costs, and review AFROTC and OTS selection profiles. All supporting figures are located in the Appendix B.

UPT ATTRITION TRENDS

The U.S. Air Force traditionally measures UPT success through training attrition analysis. The quality of a given accession group depends on how many candidates reach the training standard. Viewing accession quality solely on pilot training success, while somewhat narrow, is rooted in the premise that attrition is expensive in terms of dollars and personnel.

The average cost of an FY 82 commissioning program ranged from $8800 to $27,000 per individual; while the cost of each FY 82 UPT graduate approached $322,000 (18:1). Without considering major weapon system training, the cost impact of training attrition is obvious. Training program costs are easily expressed in dollars; but, personnel costs are expressed as lost opportunity and utilization costs. From the accession perspective, overly guided selection systems risk passing over quality UPT candidates not meeting the degree requirements, but who are more likely to succeed at pilot training. The requirements driver risks denying opportunity to a group of nontechnical candidates. In a later dimension, the candidate who eliminates from UPT faces a difficult juncture. Unless the eliminee possesses a critical, usually technical, skill he will likely be separated. The Air Force loses its commissioning investment and the individual could be deeply disappointed. A negative change in future retention, a policy reversal, or increasing end strength manpower levels, could easily change the eliminee policy. Larger numbers of eliminees would remain on active duty to fill larger requirements. Analysis of attrition costs is a straight forward exercise; however, analyzing the causes of the latest attrition upswing is much more difficult.

UPT attrition exhibited dramatic swings over the years. Attrition changes could result from a variety of factors: accession quality, moti-

vation, training, syllabus changes, instructor ratio, and flying hours to name a few. With a large variety of factors affecting attrition and a variety of agencies controlling one or more factors, a short sighted tendency could arise. The tendency centers on accepting the status quo and laying the blame for the problem elsewhere. Another difficulty arises when analyzing too small a piece of pie and losing statistical significance. To avoid these pitfalls, the following look at UPT attrition addresses large, macro trends and recognizes that accessions are but one of many attrition factors.

Figure 9 depicts the course of UPT attrition since 1968 (20:1; 23:16). Overall FY 83 USAF pilot attrition of 29.0 percent is nearly three times the FY 78 figure of 10.3 percent. Also, current attrition approaches the rate experienced in the early 1970s when pilot production rates were about 80 percent higher. Figures 10 through 13 graphically display attrition by entry source since 1977. Since 1968, the pilot attrition in each entry source has varied; however, since 1977, the attrition rates for all commissioning sources have increased at a steady rate. Indeed, ROTC, OTS, and AFA experienced nearly the same rate of increase. Non-rated UPT entries continued to attrit at the highest rate, while navigator attrition remains exceptionally low. The graphs dramatically show the attrition trends but do little to explain the causes. Why did AFROTC and OTS swap historical positions on the attrition ladder? Why did AFA attrition increase by 270 percent in five years? The increases cut across virtually every entry source. The root causes could lie in accession quality, the USAF training program, or both. A review of accession attribute profiles by commissioning source, given the prediction data in Chapter 4, should provide some insight to an answer.

BY SOURCE ACCESSION ATTRIBUTE PROFILE

The UPT attrition increases were accompanied by relative changes in the individual success predictors identified in Chapter Four: AFOQT-P, technical degree, age, and PPL. Figures 14 through 17 chart AFROTC versus OTS on the four indicators. Figure 18 charts the age and AFOQT-P variables for the AFA. Since a small percentage of the AFA pilot candidates take the AFOQT, no direct comparison is possible. Degree and PPL were not included for the AFA because all AFA cadets graduate technically qualified and must complete a Flight Instruction Program. Also, all ROTC and OTS pilot candidates without a PPL complete a flight screening program. Against the profile backdrop was the following pilot candidate production by source.

Pilot Production By Source

Source	FY79	FY80	FY81	FY82	FY83	FY86 Forecast
AFROTC	596	744	870	891	1087	960
OTS	N/A	227	404	552	779	728
AFA	631	597	587	584	574	639
Total	1227	1568	1861	2027	2440	2327

TABLE 7

Except for the AFA, production trends by source and in total were up. In particular, OTS increased production substantially over the five years. As production increased, attrition increased. On the other hand, AFA attrition rose during a period of production stability. Some of the attrition since 1979 may be explained by the trends of the success predictors depicted in Figures 13 through 18.

The attrition and predictor correlations are not neat and obvious; however, some valuable interpoloations are possible. The age variable has remained stable. The AFA remains the youngest and lowest attriting group. The AFROTC and OTS age differential remains the same. AFROTC entries average 1½ years older than AFA entries and OTS entries average 1½ years older than AFROTC entries. PPL entries were also stable except for OTS in FY 82, the year just after the release of the first predictor study and just prior to a quantum production jump. The big changes occur in AFOQT-P profiles, probably the most powerful predictor, and technical degree profiles. OTS entries with technical degrees remained very low, at about 11 percent, and even declined slightly; while AFROTC technical entries declined sharply from a high of 74 percent to an FY 83 low of 40 percent. The AFOQT-P average for OTS showed no discernable trend, but on average, was up slightly. To the contrary, AFROTC average AFOQT-P scores decreased significantly from the high 70s in FY 80 to the low 60s in FY 83. The least predictor turbulence occurred among AFA cadets and they experienced the lowest attrition. Even though attrition more than doubled through FY 82, the overall figure (14.2 percent) was still relatively low. AFROTC has experienced the greatest predictor turbulence and attrition has climbed dramatically to an FY 83 high of 34.6 percent. While remaining a relatively young group with few private pilots, declining AFOQT-P scores and technical degree percentages track down just as attrition climbs. On the other hand, the OTS predictors have varied somewhat, but in an offsetting fashion. Age and technical degree factors were offset by slightly higher AFOQT-P scores and larger numbers of PPL holders. The offsets produced a stable attrition rate after FY 80. The FY 80 attrition low of 13.2 percent occurred in a very low OTS production year. The OTS and AFROTC attrition trends can also be explained partly by the timing of the UPT predictor studies.

Both OTS and AFROTC have revamped selection procedures to emphasize the results of the predictor studies. AFROTC selections are completed 2-3 years in advance; hence, any positive effect on AFROTC attrition is always years away from initial action. Conversely, OTS is a short lead source and entry characteristics can be affected in 6-9 months. Since OTS acted on its 1981 AGE study, OTS attrition has been the most stable of the commissioning sources. The future trend in AFROTC is positive. The FY 84 and FY 85 cadet pilot selections are complete and were toughened up in light of the late 1982 ROTC Age Study. The success indicators rise sharply in the outyears.

The rise in UPT potential was accomplished in different ways by AFROTC and OTS. The AFROTC rise was accomplished within the constraints of academic degree guidance of 50% technical graduates. OTS predictors rose or remained stable with a much higher non-technical population and a sizeable portion

of private pilots. The success of both commissioning sources in raising quality vis a vis the predictor studies demonstrates there is more than one way to solve the quality issue.

THE WARRIOR VERSUS TECHNOLOGIST DEBATE

Fifteen years ago, an Air Command and Staff College research study stated that pilot procurement was at the same time a requirement issue, a retention issue, and an attrition issue (13:2). The technology debate in the intervening years lends another facet: the warrior issue. When grinding out the retention, requirement, and attrition numbers, the Air Force must pay attention to the bottom line combat issue. Rated officer accessions are the core of future Air Force leaders, and many writers on the issue, including Morris Janowitz, set the heroic leader apart from the managers and technologists (2:-; 3:21).

The debate includes wide ranging views. Lt General Schriever plays his card for technology:

> It may be said that warfare has acquired a new phase--technological war. In the past, research and development were only preparation for the final and decisive testing of new weapon systems in battle. Today the kind and quality of systems which a nation develops can decide the battle in advance and make the final conflict a mere formality--or can bypass conflict altogether (11:230).

Conversely, an Airpower Research Institute study emphasized it is not the technology, but the man behind the weapon that makes the difference. The study cited several Egyptian and Israeli generals after the "high tech" 1973 war to strengthen the point (5:25). The middle of the road is reflected in a statement by General Omar Bradley. He stated the leader didn't need to know how to build a bridge, but he had better know what was involved. The key to integration involves a balanced perspective.

The Air Force needs future leaders who know the value of the warrior behind the weapon, who know what is involved in the technology used to create the weapon, and can integrate a war winning strategy. The Air Force seeds future leadership in its commissioning programs and must strive for balanced accessions to meet future needs. Jeffrey Record, a military reformer, points out we must not confuse efficiency with effectiveness in our programs (10:11). Efficiency is the orderly flow of people, paper, and technical development. Effectiveness means combat ability, the means and the will to fight and win. The rated accession mix depends on both quantitative, meaning efficient; and qualitative, meaning effective, factors. Effective and efficient procurement must step back and assess all factors. The pilot procurement program strives to efficiently assess force structure, but the procurement program can only be graded by producing an effective combat rated officer.

SUMMARY

UPT attrition, while varying over the last decade and a half, climbed rapidly after 1978. The high costs associated with attrition underscore, along with graduate quality, the importance of identifying potential pilots early in the selection process. Front loading quality candidates based on known predictors of success provides a means to reduce attrition risk and realize dollar and personnel savings. AFROTC and OTS recently tailored their selection systems to include known predictors and the results are encouraging. OTS attrition has leveled. AFROTC trends, due to the two to three year source lead time, should improve beginning with the FY 85 UPT classes. The AFA attrition increases are alarming, but except in FY 83, have not approached the level of the other entry sources. The warrior versus technologist debate refocuses the real reason for a rated accession program: to produce combat rated officers. Any analysis should avoid getting lost in the numbers and review the qualitative factors in the selection and training of a rated force with the ability and will to win in combat.

Chapter Six

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Meeting the technology of today and tomorrow coupled with the impact of accession quality on UPT attrition and warfighting capability produces a requirement versus quality dilemma for Air Force personnel procurement programs. The research problem developed in Chapter One approaches the dilemma with a hypothesis: the present academic degree guidance for rated officer accessions does not adversely impact UPT accession quality and satisfies rated requirements demanding specific technical degrees. The hypothesis was tested in four ways. First, the analysis determined the requirement and assessed the accuracy of past requirement determinations. Second, a review of commissioning source capability defined the track record and future potential to meet the current academic degree guidance. Third, a literature search reviewed recent UPT performance models and established the link between academic degree guidance, pilot candidate quality, and actual UPT attrition. Finally, the analysis related commissioning source trends and predictor profiles to UPT attrition trends, and reviewed a major qualitative argument. The findings and conclusions which follow flow from the hypothesis tests, while the recommendations strive to maintain the efficiency of the academic degree guidance concept and provide maneuver room to increase the quality of pilot candidate selections.

FINDINGS

The four hypothesis tests determined that the methods used to specify academic mixes and attrition causes are somewhat soft and fluid. Consensus on methods, priorities, and future research direction are hard to find. Several exigencies cloud the issue vis-a-vis the hypothesis tests.

In an effort to meet the technology requirement, the Air Force leveled strict academic degree guidance on base line commissioning sources. The technical requirement used to establish the degree guidance was not wholly determined by sound, technical reasoning. The pipeline flow model used in this analysis defined a need for between 635 and 973 technically qualified pilot accessions per year, about one-third of which are engineers. Since the model is sensitive to retention rates, the upper limit of the range reflects the ideal accession level. The 973 upper limit output by the model is 10 to 15 percent lower than the total technical pilot production per year since 1979. However, the manpower requirement determination is a major weak point. The requirement appears fluid and no indepth manpower study has ever addressed technical pilot needs in aggregate. Conversely, the capability to produce technical pilot candidates presents a brighter picture.

The second test shows the burden of producing pilot candidate engineers and scientists fell to a traditionally technically oriented service academy and AFROTC. To meet the perceived demand, AFROTC was extensively programmed, while OTS only incidentally produced technically degreed pilot candidates. Overall, the commissioning sources were very successful in meeting the academic guidance, although a substantial number of AFROTC cadets had taken calculus only and were not true technical degree holders. Future UPT production levels and current precommissioning enrollment do not flag any future capability problems.

The third hypothesis test demonstrated the UPT prediction art is not exact. AFOQT-P scores, a technical degree, age, and a private pilot license are important indicators of success, not a guarantee of success. AFROTC and OTS pilot selections in the past year show similar pilot potential overall. AFOQT-P scores, the best indicator, approximate each other; however, AFROTC selected younger, more technical candidates while OTS selected an older, less technical group with a high percentage of private pilots. Furthermore, the quality of the input as measured by the indicators plays a relatively small, although important, role in overall UPT attrition. The ROTC and OTS comparison indicates quality (as defined by the predictor studies) can be achieved with varying mixes of attributes.

The part which input quality plays in overall attrition was demonstrated by the fourth hypothesis test. The recent predictor studies formatted model UPT candidates and provided a vehicle for review of past UPT candidate success. The AFA attribute profile remained stable, and AFA attrition remained the lowest of the three commissioning groups. The OTS profile improved and the group's attrition has begun to level as OTS pilot production numbers stabilized. AFROTC experienced the greatest profile turbulence as AFOQT-P scores and technical percentages declined during a period of increased production. As a partial result, AFROTC demonstrated the highest attrition rate last year of any entry source including nonrated officer inputs. The AFROTC profile trends upward on recent selections of cadets graduating over the next two years. From the onset, the study assumed the whole person concept was a constant in the selection process. Finally, the technologist-warrior debate refocuses the need for an accession program which is both efficient and effective.

CONCLUSIONS

The conclusions which follow flow directly from the findings. The final conclusion addresses the research hypothesis.

1. The two major keys to accurate academic degree guidance are requirement definition and accurate retention estimates. While retention estimates are uncertain, but priority derivations, the requirement definition draws on many sources and is prone to error.
2. Given the results of the pipeline flow model, past academic degree guidance overstated the need and current strategies continue to do so.
3. Current academic degree guidance extensively programs technical

needs to AFROTC and does not take advantage of OTS production potential.

4. Along with future Air Force need, UPT potential is the most important selection criteria and the current individual predictors are not consistently accurate. New measurement devices are required to improve prediction capability.
5. Neither the current predictive attributes nor the future Air Force Human Relations Lab (AFHRL) studies address motivation, the whole person concept, nor assess the warrior versus technologist debate.
6. Declining predictor profiles point to a small, but important, cause of high UPT attrition, particularly in the AFROTC case.
7. Efforts to reduce costly UPT attrition cannot focus solely on quality of inputs. Resource and training considerations must be folded into a combined approach.
8. The current academic degree guidance oversatisfies rated requirements demanding specific technical degrees and by constraining selections contributed to a decline in AFROTC accession quality as measured by the AFOQT-P.

RECOMMENDATIONS

1. Reduce the pilot academic degree guidance mix in AFROTC to 35-40 percent, split one-third engineers and two-thirds scientific degrees. The recommendation provides an 88 to 136 officer hedge over the likely case requirement to compensate for availability problems and unforseen future requirement builds. The mix percentages are floor figures; freeflow above the floor for quality may or may not increase technical accessions, but maintains mix efficiency and provides room for the effective freeflow of quality pilot selections.
2. Investigate providing academic degree guidance to OTS. An increase to a 16 percent technical mix in OTS would allow a 5 percent floor cutback in AFROTC. Action should consider the non-rated engineer and technical levies on each source to avoid recruiting problems. Task OTS to recruit by degree (minimum technical percentage) to cover short notice requirement changes which cannot be met by the baseline commissioning sources during accession surges.
3. Institute an annual requirement forecast. Levy pilot technical production goals based on comprehensive annual forecasts in concert with the ATC Officer Procurement Conference. Forecast must cover 3-5 years into the future to properly program the baseline commissioning sources.
4. Incorporate the Air Force Management and Engineering Agency technical requirement study into the next forecast cycle. The study should provide a better look at the "real" total

Air Force technical requirement and strengthen the confidence of the rated forecasts.

5. Broaden the AFMEA study to evaluate rated technical requirements.
6. Incorporate the AFHRL UPT predictor study when available. If the AFHRL study improves the prediction art, the results will likely impact technical accessions.
7. Construct a data base large enough to assess technical pilot candidate persistence at UPT. In concert with more definitive requirements, the data would refine pipeline flow variables and produce a more reliable technical accession forecast.

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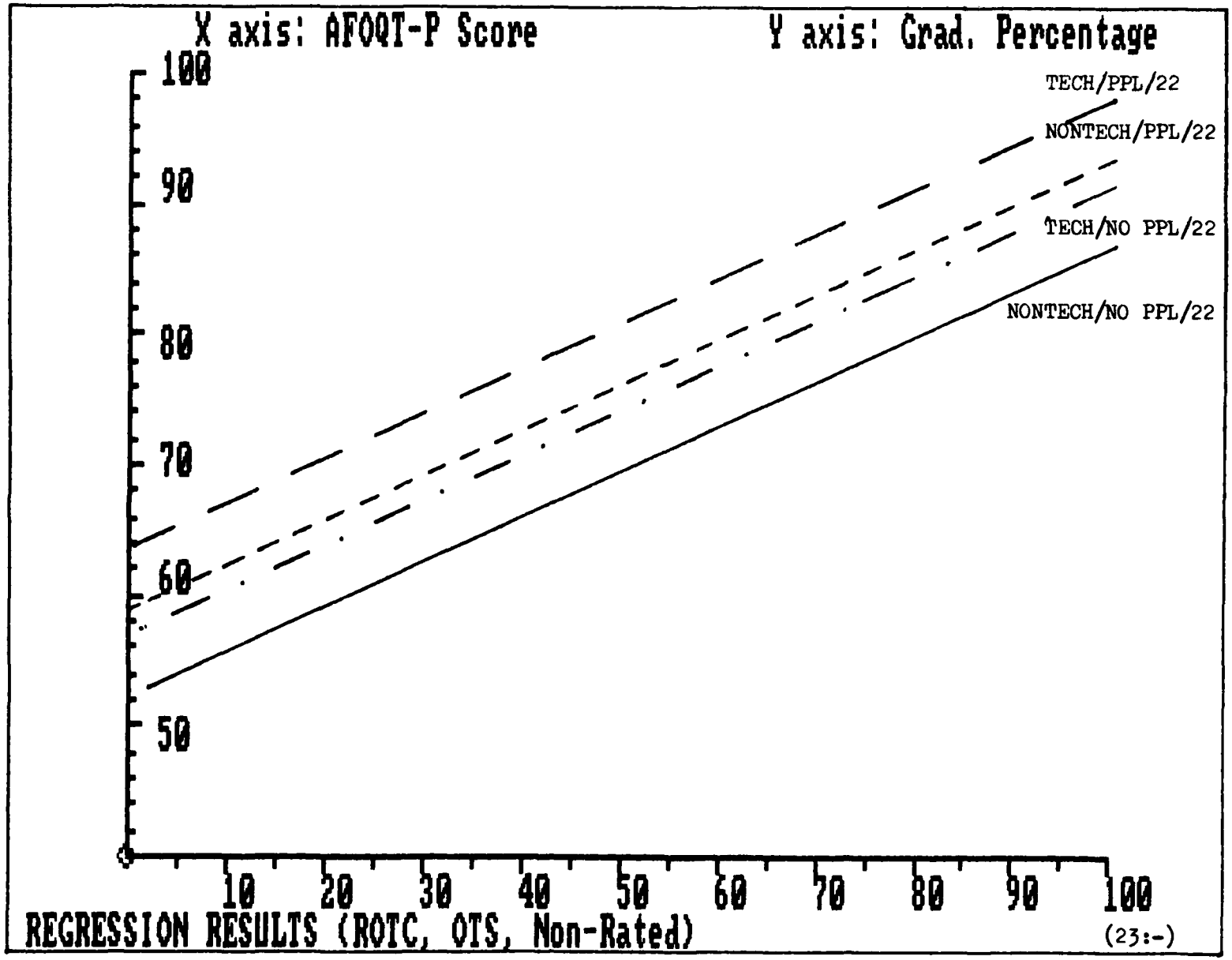
APPENDICES

APPENDIX

-A-

REGRESSION RESULTS AND COMPARISON CHARTS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Y axis: Grad. Percentage
100
90
80
70
60
50
TECH/PPL/22
NONTECH/PPL/22
TECH/NO PPL/22
NONTECH/NO PPL/22
10
20
30
40
50
60
70
80
90
100
REGRESSION RESULTS (ROTC, OTS, Non-Rated)
(23:-)

FIGURE FIVE

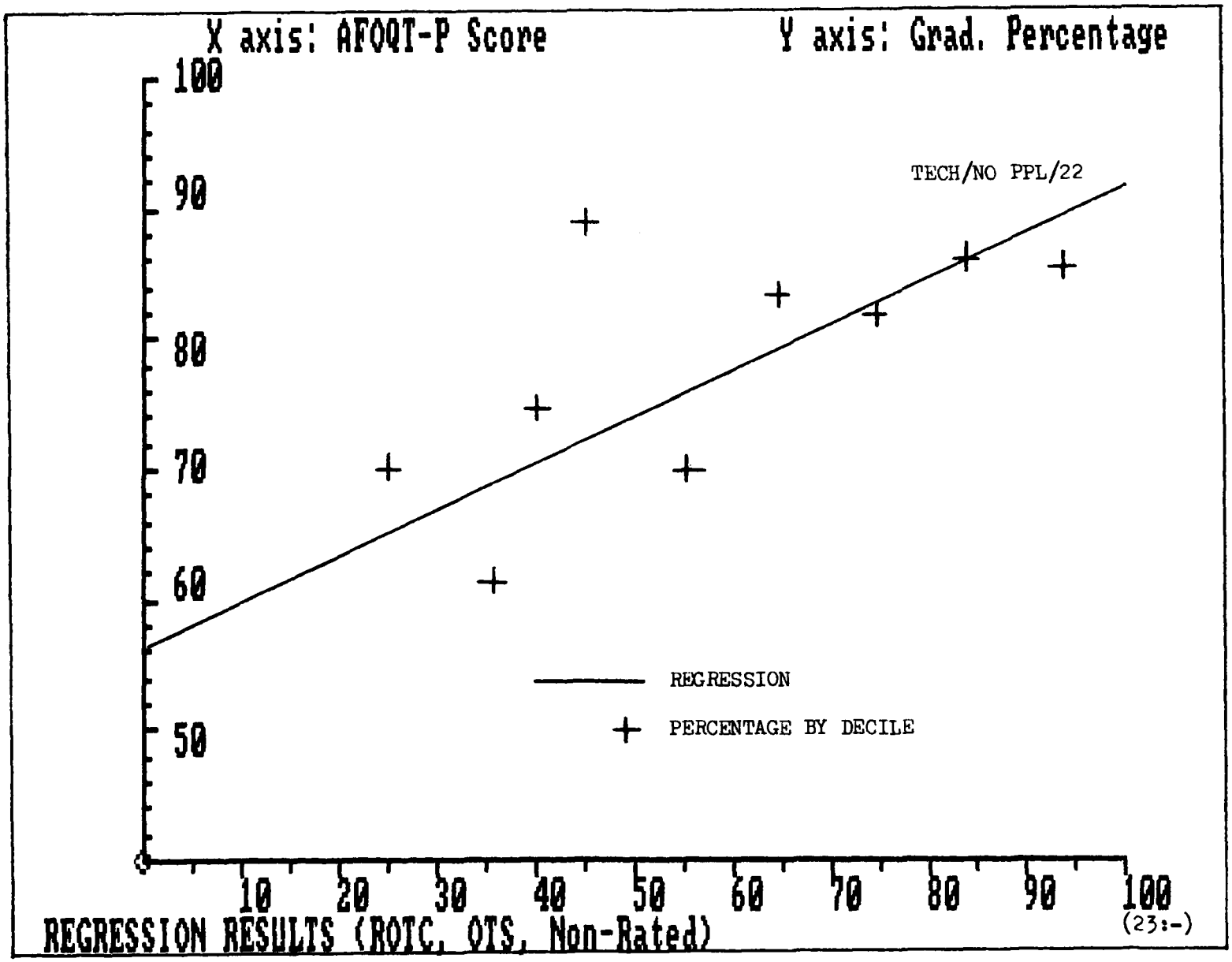

X axis: AFQQT-P Score
Y axis: Grad. Percentage
100
90
80
70
60
50
TECH/NO PPL/22
REGRESSION
PERCENTAGE BY DECILE
10
20
30
40
50
60
70
80
90
100
REGRESSION RESULTS (ROTC, OTS, Non-Rated)
(23:-)

FIGURE SIX

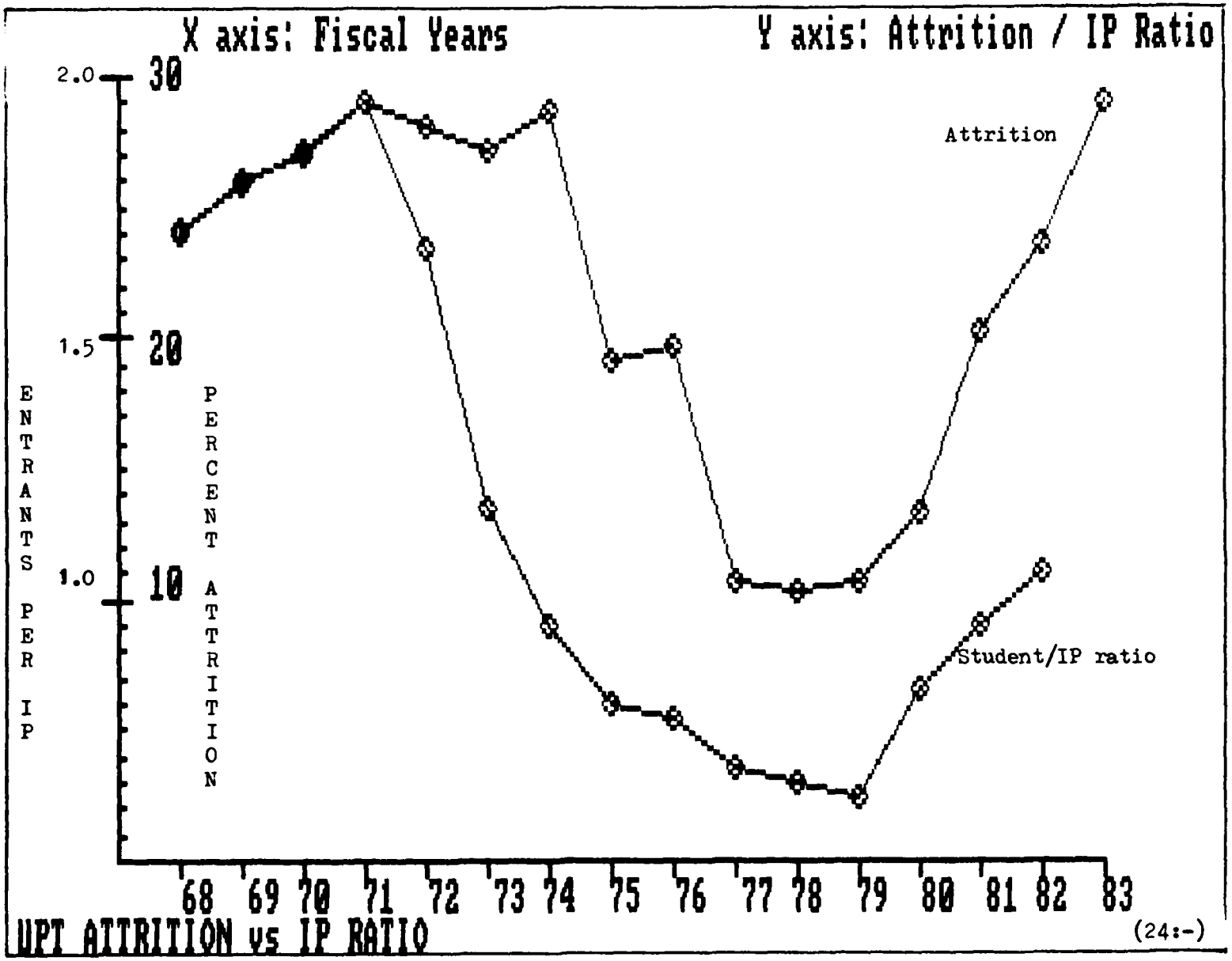


FIGURE SEVEN

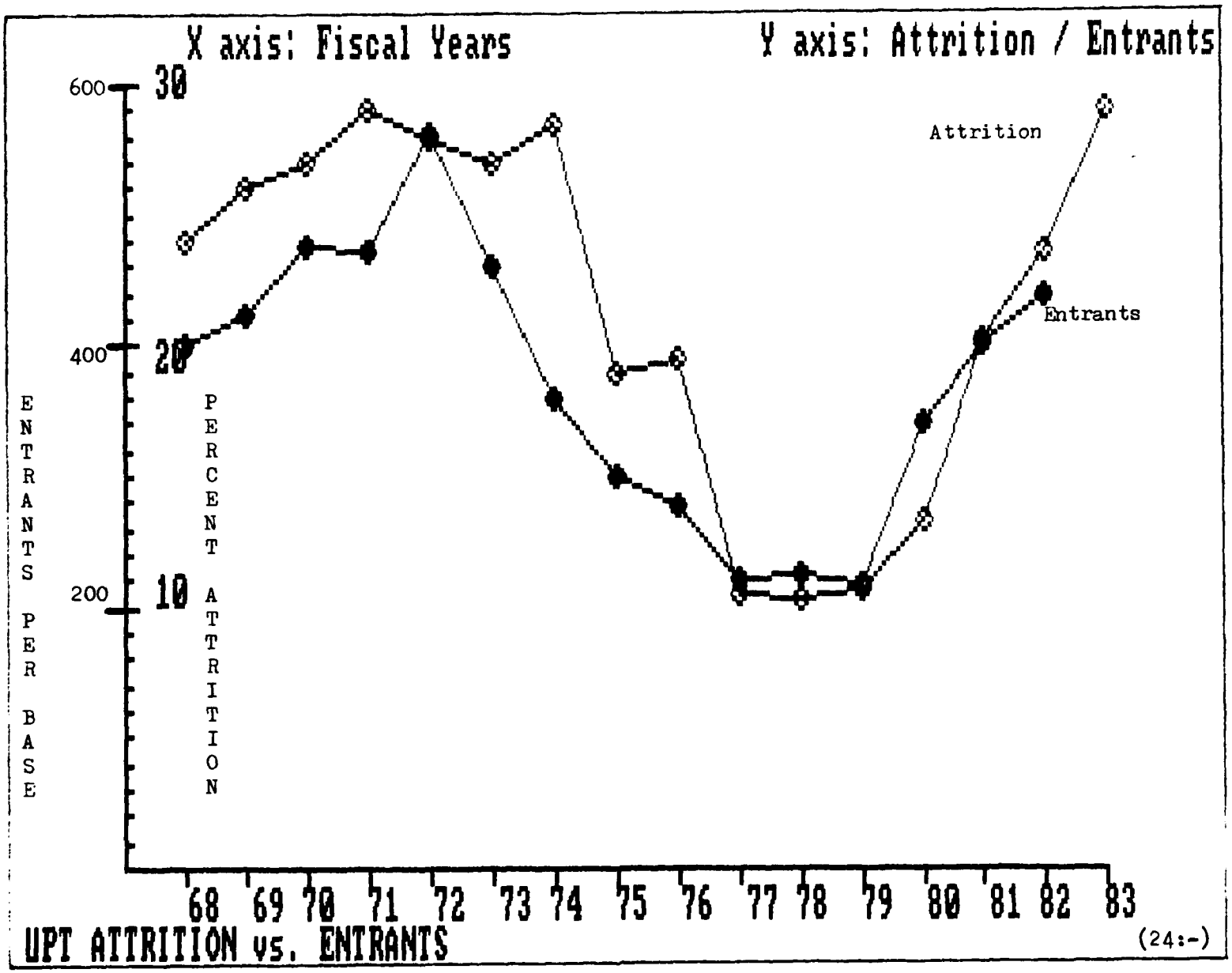
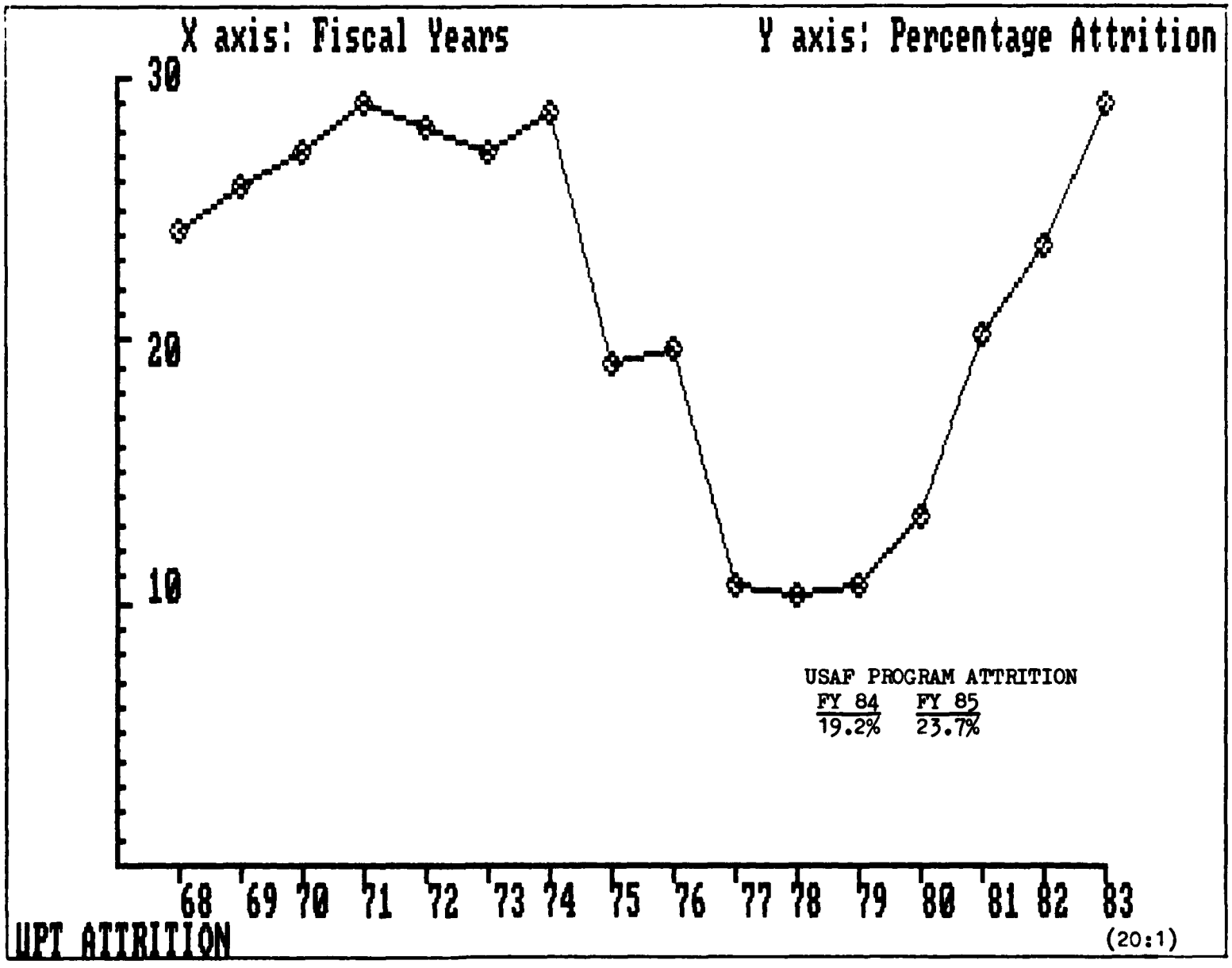


FIGURE EIGHT

APPENDIX

-B-

UPT ATTRITION AND ACCESSION SOURCE PROFILE DATA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Y axis: Percentage Attrition
30
20
10
USAF PROGRAM ATTRITION
FY 84
19.2%
FY 85
23.7%
68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83
UPT ATTRITION
(20:1)

FIGURE NINE

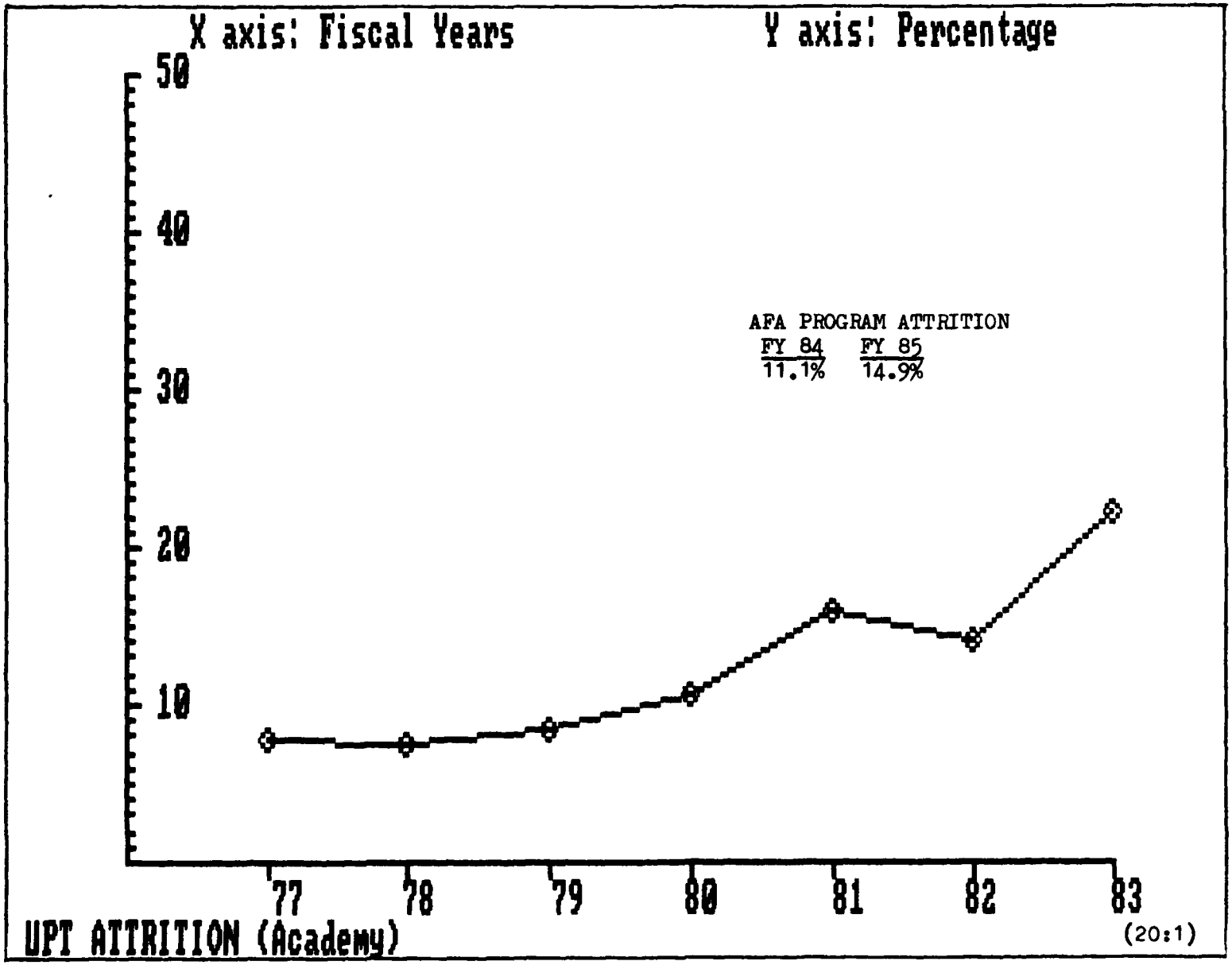
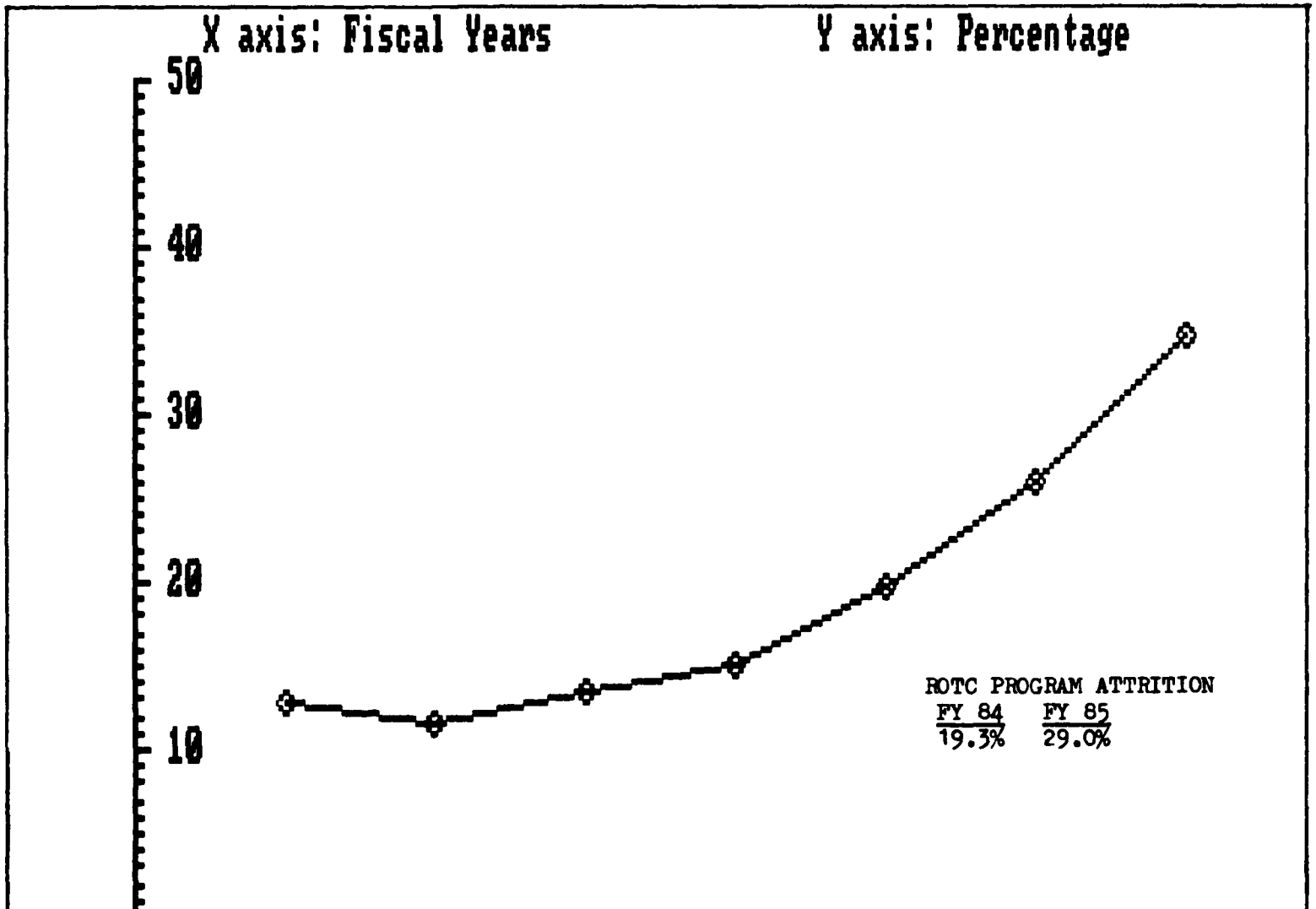

X axis: Fiscal Years
Y axis: Percentage
50
40
30
20
10
AFA PROGRAM ATTRITION
FY 84 FY 85
11.1% 14.9%
77
78
79
80
81
82
83
UPT ATTRITION (Academy)
(20:1)

FIGURE TEN



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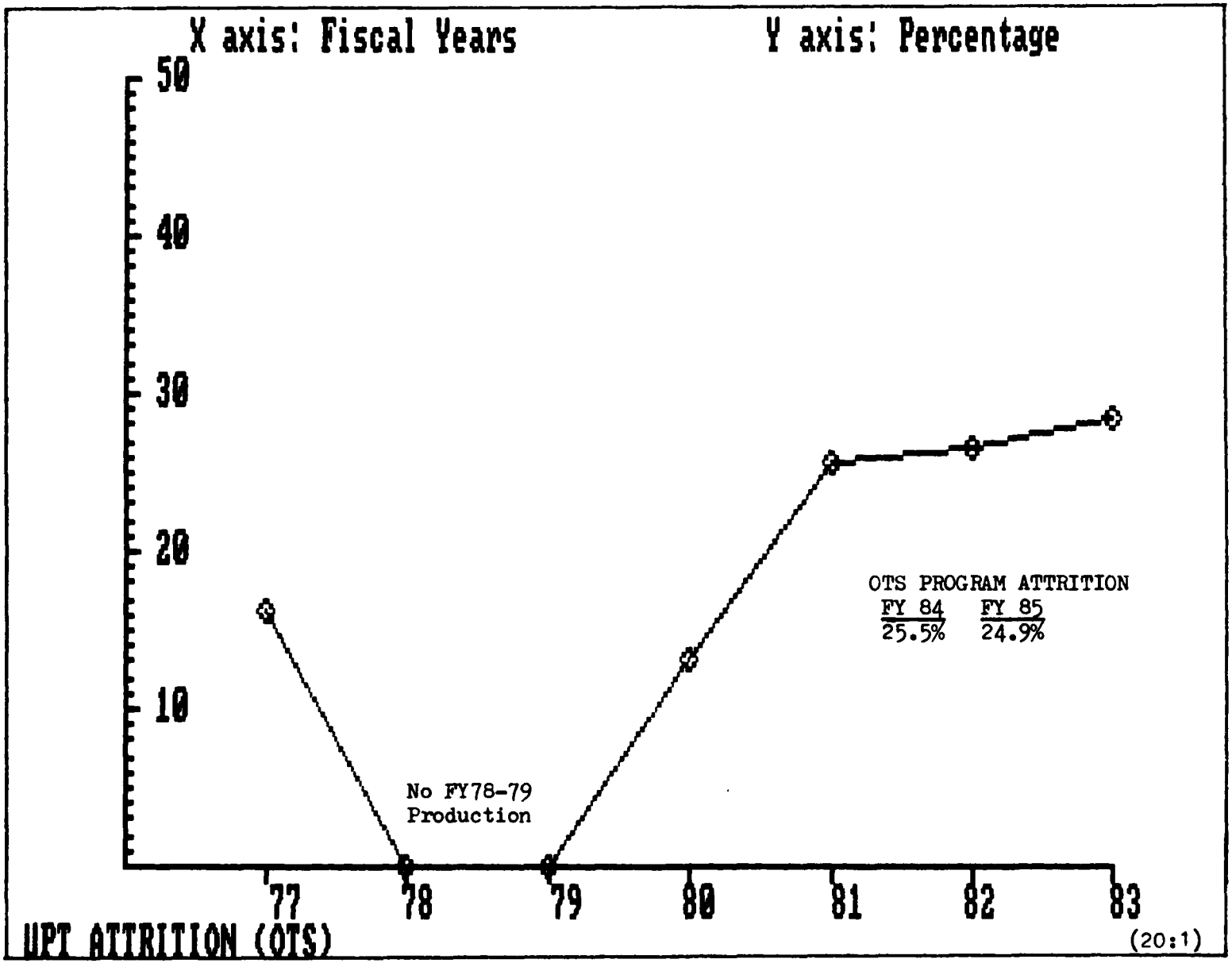

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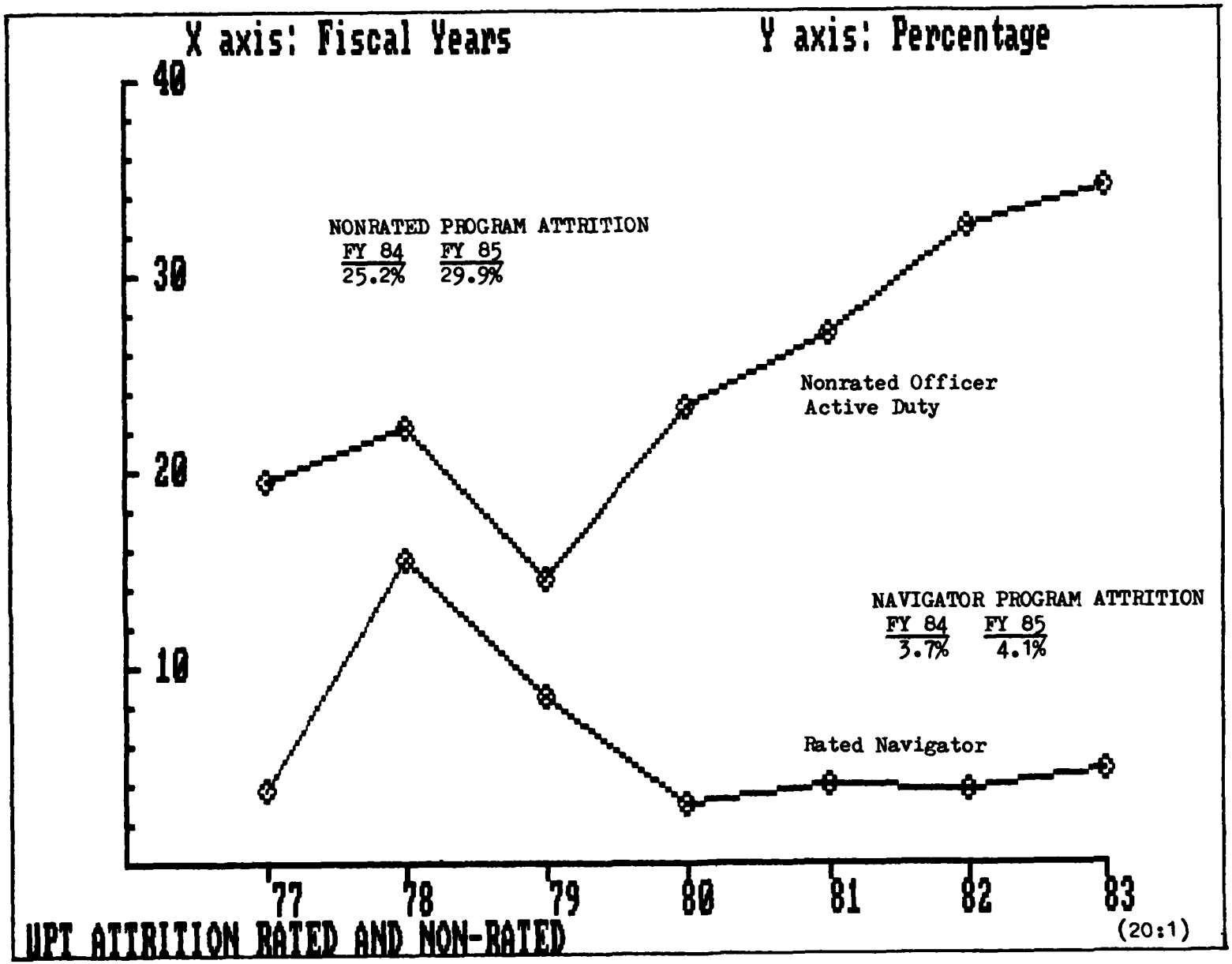


FIGURE THIRTEEN

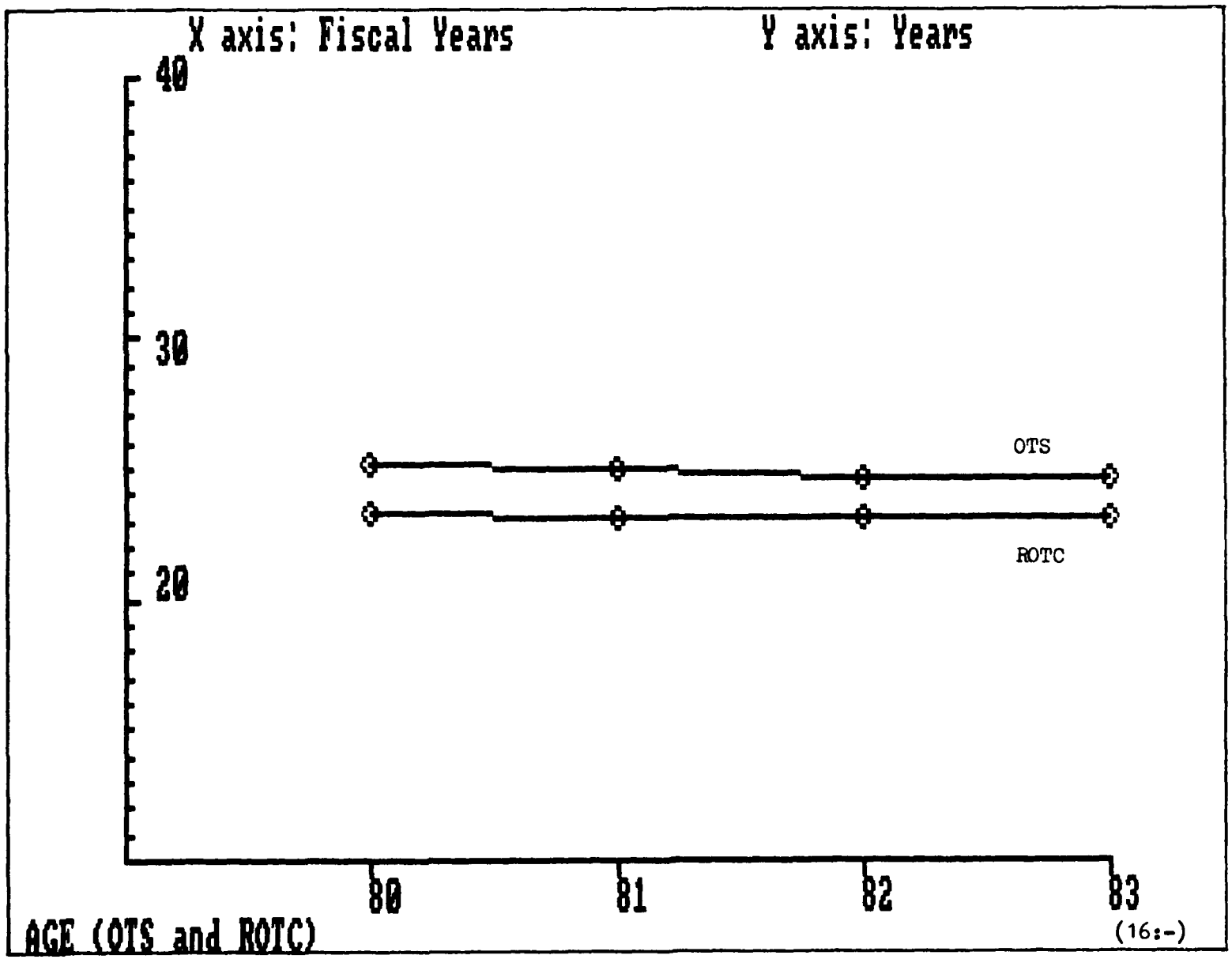
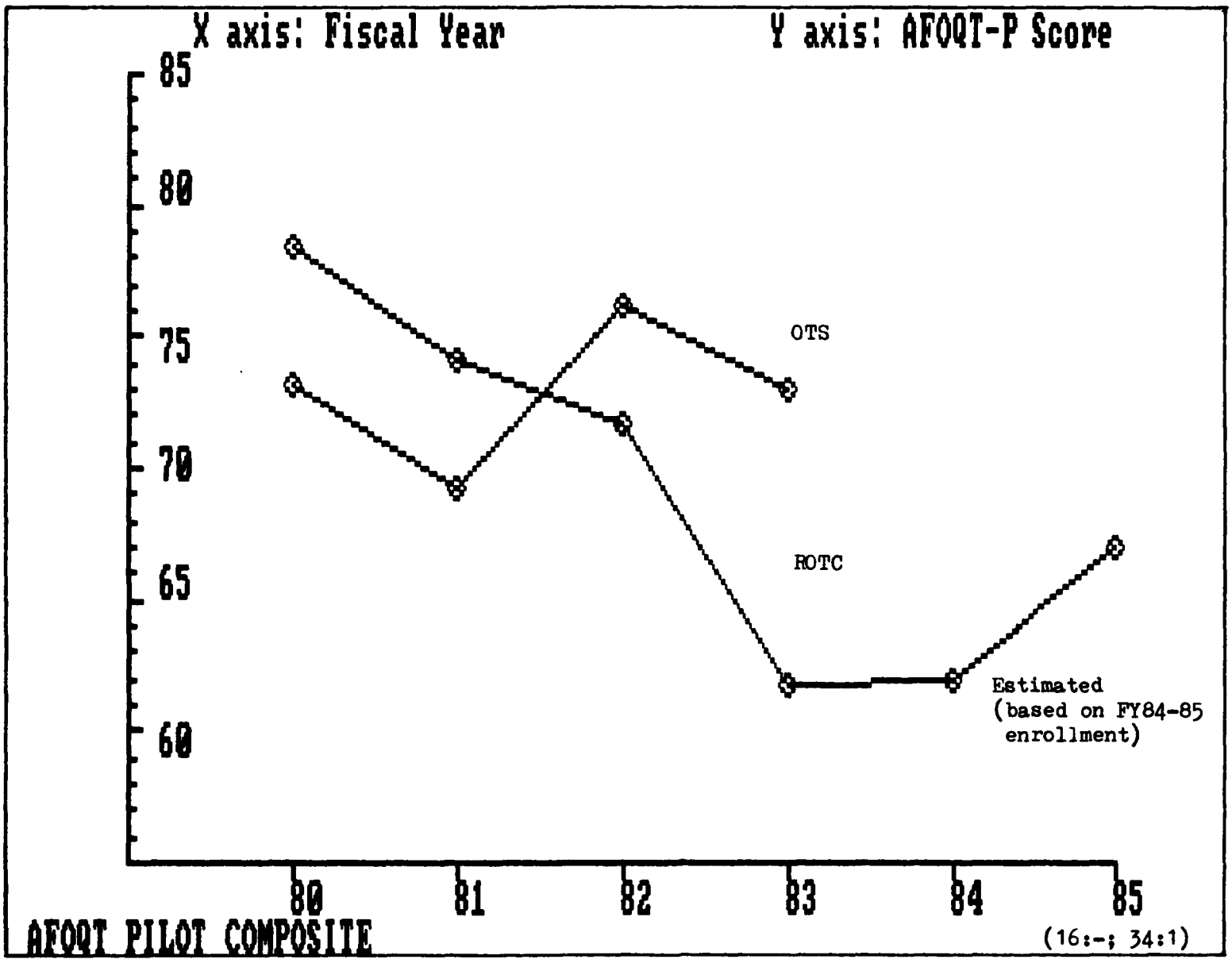


FIGURE FOURTEEN



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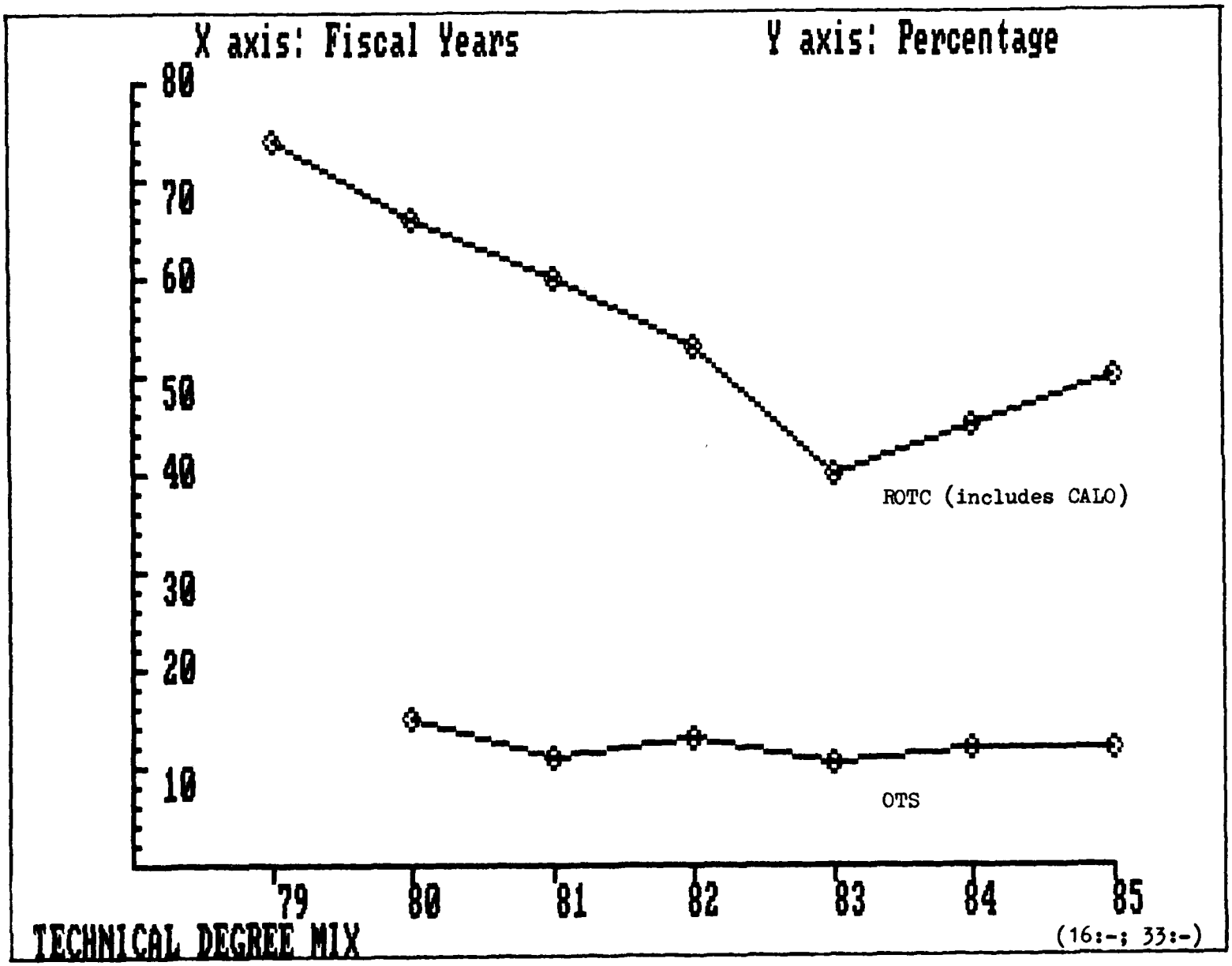

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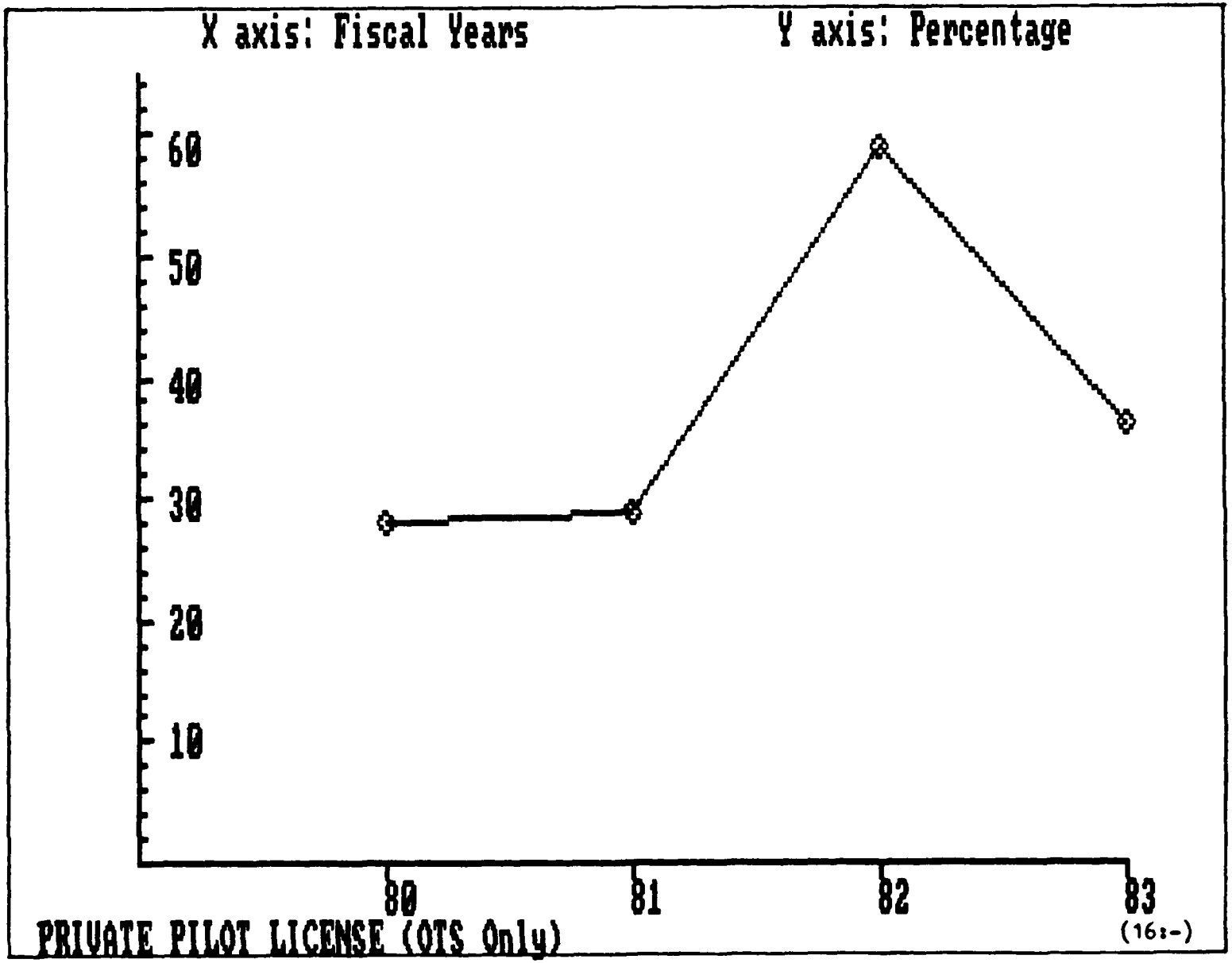

FIGURE SEVENTEEN

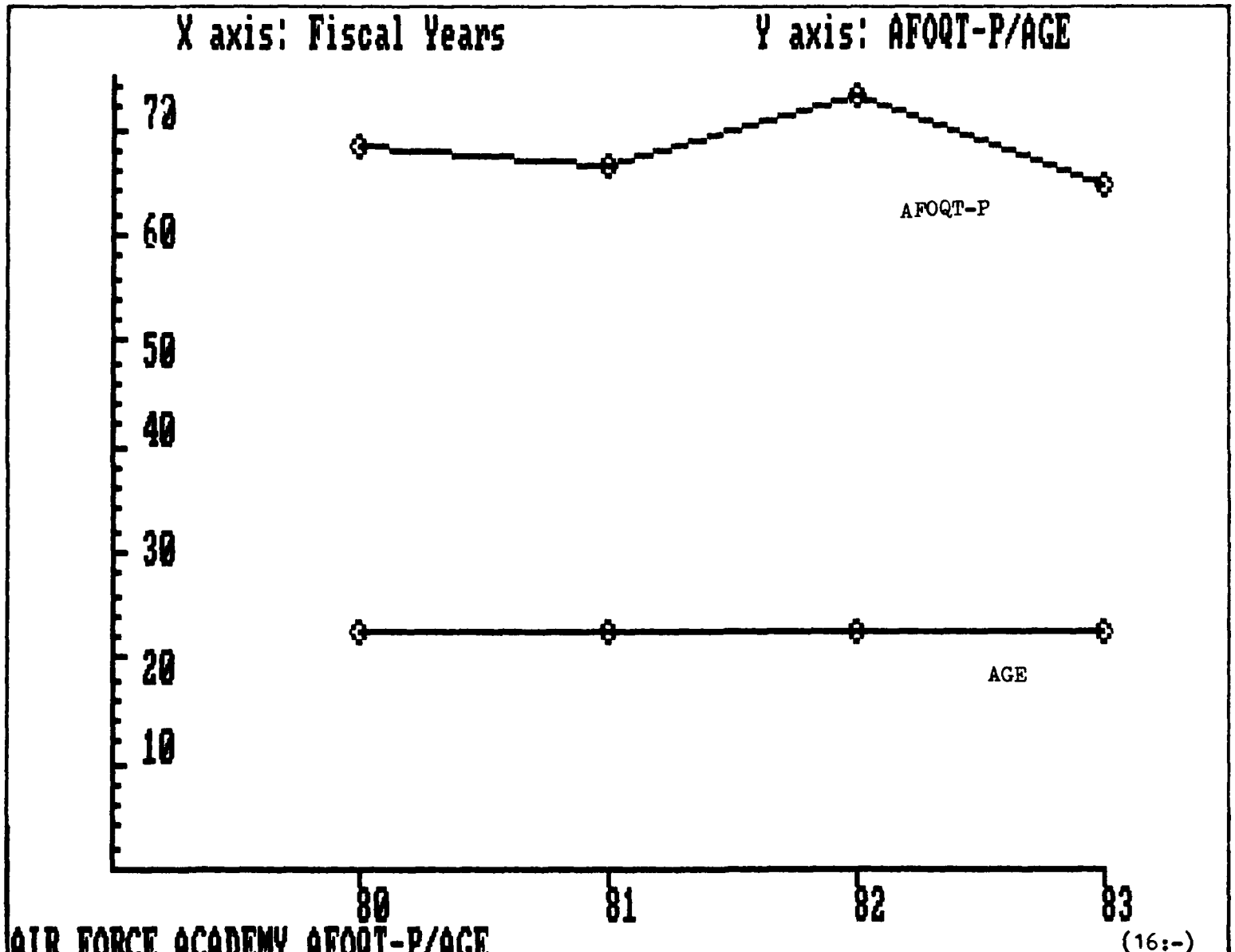

FIGURE EIGHTEEN